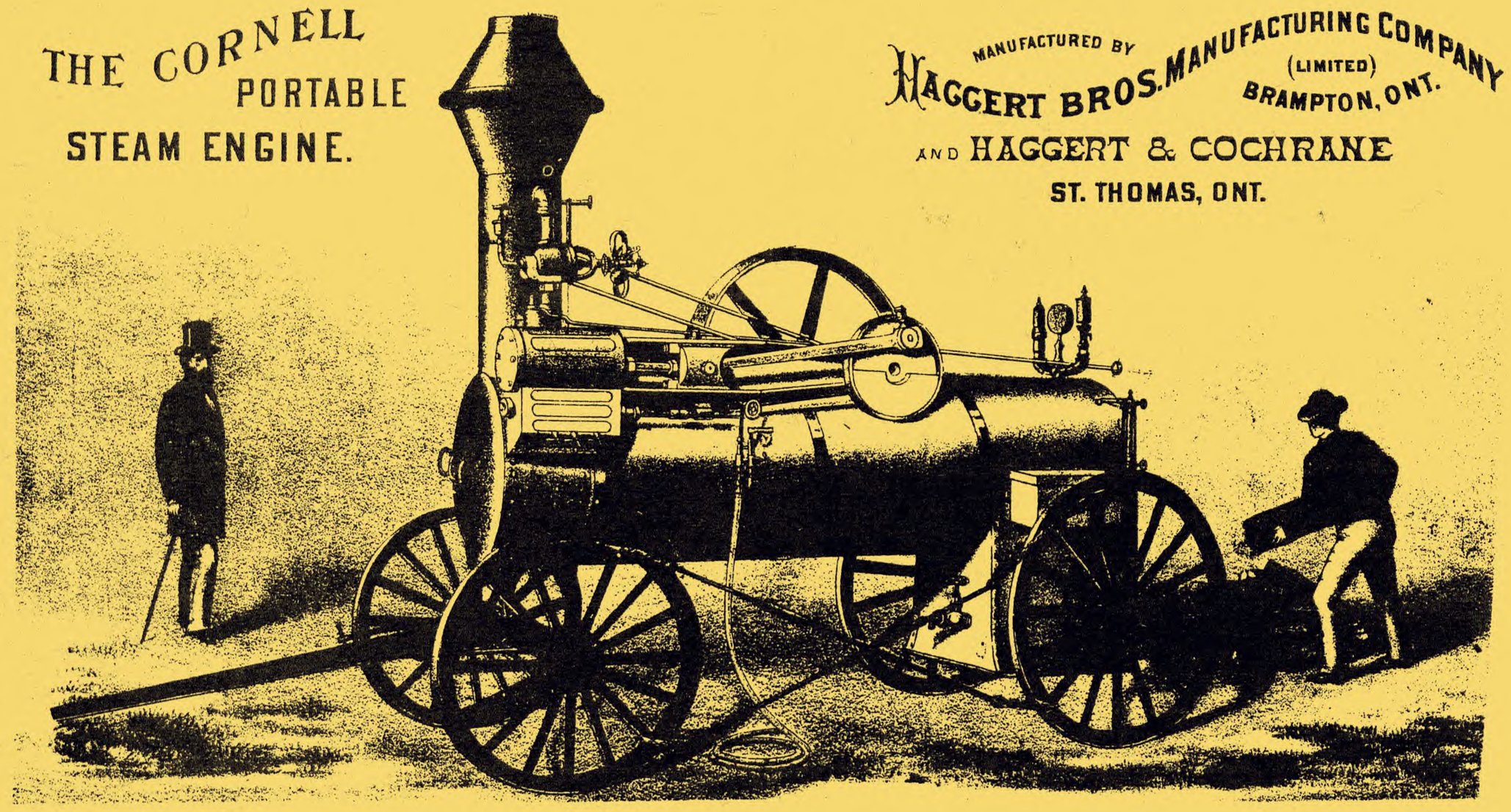
ONTARIO'S

THRESHING MACHINE

INDUSTRY



School of Engineering
University of Guelph

ONTARIO'S THRESHING MACHINE INDUSTRY

A short history of these pioneer companies

and their contribution to Ontario agriculture.

by

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The School of Engineering from time to time has produced historical reviews on the contributions of pioneers to the agricultural systems we enjoy today. Industries featured in earlier publications have been land drainage and irrigation.

On the occasion of the Centennial of the Ontario Agricultural College a short history of the pioneer Ontario companies concerned with the threshing of grain is featured. The research work is primarily that of Harold S. Turner of Goderich, an ardent practical historian and early thresherman.

As the years go by the visual efforts of the pioneer manufacturers of farm machinery are fast disappearing. This publication is a record of one class of machinery. It is timely that it be recorded because without doubt this period covered the most picturesque chapter in our Canadian agricultural history.

INTRODUCTION

A threshing machine, sometimes called a grain separator, combines three major functions formerly done by hand - shelling the grain from the head, separating the straw from the grain and chaff, and separating the grain from the chaff.

The first function was originally performed with a flail, or by treading the grain out with animals. It was a long winter's shore performed on the barn floor. It took all day to flail out seven bushels of wheat or 18 bushels of oats. It took another day to separate the grain from the straw and chaff by winnowing using a course sieve or riddle or by the use of wooden fork with another person fanning up a wind with a sheet. The grain was then bagged.

The fanning mill was the first step toward the mechanization of the grain cleaning operation. It was possible to clean one bushel per minute with one man turning the fanning mill, one man feeding it and one man bagging. With less help production went down.

The first threshing machine worthy of the name was patented by Andrew Meikle in Scotland about 1786. It had an open peg-tooth cylinder and a similar set of teeth which acted as concaves. It was operated by a one or two horse-power or a tread mill. Machines of this type were common in Canada in the 1830's-1840's.

The first patent for an agricultural implement in Canada was taken out in 1826 by Noah Cushing of Quebec for a threshing machine.

Hiram A. Pitts of Winthrop, Maine, patented a thresher in 1837 which separated as well as threshed. The straw passed over an endless apron. This was the first practical machine and many were built under license in Canada. The power needed was about eight horse-power. John A. Pitts, a brother, moved the plant to Buffalo and many of this type of thresher were imported under the Buffalo-Pitts company name. A cleaner was added in 1850. By 1880 the efficiency of threshers had improved to the point where it was no longer necessary to pass grain through a fanning mill to sell it.

The early threshers had no straw carriers. Straw elevators saved two men needed to build the stack but at an additional charge to the farmer. The straw stacker could be swivelled from side to side. Wind stackers were introduced about 1890. They required more power but improved the working conditions at threshing time.

In 1885, for a threshing machine of 750-800 bushels per day capacity, two men were used to cut the bands on the bundles, two men fed the bundles, two men measured and bagged the grain - by 1900 these operations were all automatic and the mill had double the capacity of 1885.

Horse power provided the energy needed to thresh the grain. There were two types of machine used to convert the energy developed by the animals into motion suitable for the thresher.

A tread power depended for energy on the weight of the horses (1 to 4) which caused an endless chain to turn. A brake was released to start the tread power moving. A tread power was much harder on a horse than a sweep. The sweep power converted the linear motion of the horse into rotary motion used to operate the thresher. From one to 14 horses were hitched to the sweep which was geared through long tumbling rods to another set of gears at the thresher.

Horsepowers could not transmit the power required to operate larger threshing mills. Steam power provided the first successful mechanical prime mover for agriculture. The problem was to build a steam engine cheap enough for the small farmer. This proved to be impossible and the threshing of grain became a custom operation. It was not really a farm machine.

Portable steam engines hauled by horses first appeared in England in 1832, and in the United States about 1850. These were a simple form of steam engine of 8 to 14 horsepower (hp) for belt work. This form of machine was introduced in Canada in 1869. As they huffed and puffed at their work they rocked gently backward and forward under the impulse of each piston stroke. Wedge shaped wooden blocks called "chocks" and cross chains were used against the wheel to keep it in place. They burned wood or coal. In spite of the advent of steam many farmers still liked the horsepower.

The Ontario Legislature enacted legislation in 1875 to guard against accidents due to tumbling rods on horsepowers. In 1889 an Act was also passed requiring spark arresters on steam threshing engines.

The first self propelled steam engine of note was produced in 1873 by Merritt & Kellog of Battle Creek, Michigan. It was not until 1885 before this type of machine became really popular. The thresher could finally get rid of that extra team of horses.

The steam engine boom was from 1885 to 1912. The age of steam drew to a close in the 1920's challenged by the more efficient gasoline tractor. Steam had reached the peak of its efficiency but the machines were still large and heavy, they used a lot of water, were subject to freezing weather and frequent boiler inspections. The last new steam threshing engine built in Ontario was in 1928 by Robert Bell at Seaforth.

AN AGE OF ROMANCE

Few factors played so important a part in the development of the agriculture of this country and have disappeared more quickly and completely than the once familiar steam threshing engine.

After less than fifty years in widespread use supplying power for threshing and ploughing they have been completely replaced by gasoline and diesel powered tractors. The glamour of threshing has gone with the passing of these greasy and dirty old faithful servants whose rhythmic exhaust could be heard up and down every concession in the fall of the year and whose cheery whistle hailed the start or finish of threshing operations on someone's farm or announced that dinner was ready in the farm kitchen.

Picture the boy, fortunate enough to be born long enough ago to remember these early threshing scenes, as he stood at the farm gate to watch the thresher's big team of horses with their harness brass gleaming in the sun haul the portable engine in from the road. He could recall nothing quite so big on wheels. A giant round body with an enormous fly wheel on one side and an oversized smokestack hinged near the base and lying supported on a bracket. The driver perched high on a flimsy seat carefully manoeuvered his team so there would be no danger of upsetting his precious load. Next came the threshing machine, pulled by a farmer's team, its sides covered with wheels and belts and the straw carriers folded neatly up the back and over the top. Soon all was hustle and bustle around the barn. The separator was hauled up backwards into the barn and the horses led out singly between the machine and the mow. Holes were dug for the front wheels of the engine to level it and brace chains applied to hold it firmly in place. The smoke stack was erected and rails from a convenient pile raised steam while the separator was being braced and the straw carriers set. In short order the engine was puffing away in earnest, a steady stream of sheaves were dropping from the mow to the band cutter who deftly severed the band of each sheaf with a sharp knife and passed it on to the feeder who took great pride in his ability to keep a steady hum on the machine. Two or more men carried the grain to the granary keeping track of the bushels by means of small pegs in a board while out in the yard expert hands and feet worked the long straw from the carriers into a perfectly shaped stack. Where was the small boy? Well! he was just everywhere, trying to see it all but mostly he kept his eye on the engine.

The advent of the aeroplane, radio and television to a fast changing world had much less thrill than the sight of the first steam engine that clanked and snorted and threw great quantities of sparks but propelled itself from farm to farm. Many a boy missed his dinner to watch one go by on the road or risked the ire of the teacher to steal a peep out the window during class, but his greatest thrill came when he was allowed to take his first ride. Awkward and weak at first these early steam tractors were quickly improved by the manufacturers until they soon became highly efficient and pulled all their own equipment from farm to farm. Much of the virgin prairie was first ploughed by giant steam traction engines designed especially for heavy hauling.

Like railroading, threshing had an attraction that held. Most threshers stayed threshers until the end although very few every grew wealthy at the job. Many colourful characters followed the profession. Men who used copious quantities of chewing tobacco, obviously to counteract the dust. Men who could attract more dirt before breakfast than others could in a whole day or whose yarns and stories held the gang sitting around the kitchen for hours in the long fall evenings or whose tricks and stunts kept the boys amused at the barn on rainy days. Trained only by experience, these remarkable men took the improvements in equipment in their stride and passed from horsepower to portable and on to the big steam tractors with great adaptability but very few of the old steam engine operators ever developed much real love for the modern tractor which has bereft our rural areas of a picturesque chapter in their development which will never be re-enacted.

JOHN ABELL MACHINERY CO., WOODBRIDGE.

One of the most picturesque figures amongst pioneer Canadian manufacturers was born in England September 17th 1822 and emigrated to Canada as a young man. In the year 1845 John Abell settled in the village of Woodbridge, twenty miles north-west of Toronto, Ontario, and obtained employment in the waggon and stage-coach factory operated by Messrs Wood and Etheridge. Possessed with much inventive and mechanical ability, young Abell was anxious to get into business for himself and in 1847 he built a small log shop and began the manufacture of mill irons and similar articles. Here he fashioned a lathe and other tools with which he constructed, for his own use, the first steam engine to be used in the district. Assured of power to drive his machinery he immediately made plans to increase his output and in January 1862 moved into a larger building and began the manufacture of ploughs and other early farm machinery. Business increased rapidly and before many years he was employing a hundred workmen and concentrating on the production of a threshing machine which he had developed and which had met with much favour. Abell's machine, which he named the "PARAGON", was of the apron type and geared for horsepower drive. Later, gang beaters and straw carriers were added and the separator enlarged and improved and adapted for steam power.

In 1874 the establishment was completely destroyed by fire. Undaunted by this misfortune he immediately rebuilt on an enlarged scale taking into consideration the manufacture of portable steam engines which he had been planning for some time. Abell's first engines were of the locomotive boiler type with extra long smokestack topped by a screen. About this time manufacturers of upright boiler portable engines equipped with water spark arresters were openly advertising the number and names of barns burned by old fashioned, fire throwing, boiler exploding, horizontal type threshing engines with screen spark arresters. In the face of this barrage it is not surprising to find John Abell mounting his engine horizontally in front of an upright boiler for several years in the late 1870's. However, after winning over several competitors in an official test at the 1880 Toronto Industrial Exhibition, he named his horizontal engine the "TRIUMPH" and dropped his upright "WOODBRIDGE CHAMPION" completely.

John Abell was a born showman and never missed

the opportunity of displaying his machinery at every Provincial and Industrial Exhibition in Canada. He also exhibited at the Centennial Exhibition, Philadelphia, in 1876, the World's Fair, Chicago, and as far afield as the Metropolitan Exhibition, Sydney, Australia, in 1877. In all he won innumerable prizes and diplomas and a total of thirteen gold medals, a fact that he never forgot to stress in his grandiose advertisements.

Claiming that waterbottoms and domes wasted fuel by condensing steam, Abell built his "TRIUMPH" portable engines with domeless, open bottom locomotive type boilers and mounted them with side crank engines having the belt wheel on the left side and the cylinder at the firebox end. The engines had vertical V-shaped guides and an exhaust feed water heater built into the bed. Early boilers were fed by a slow speed feed pump bolted to the shell and driven by a belt from the main shaft and controlled by a tight and loose pulley on the pump shaft. Speed was governed by Judson's springless governor mounted on the steam chest. The belt wheel was 48 inches in diameter and had round steel spokes cast into the rim and hub. The danger from sparks was overcome by a patent water spark-arrester located at the base of the smokestack. This arrester deflected the exhaust and smoke downwards forcing any sparks into the water in the lower half of the extinguisher which was kept at the proper level by a connection to the pump. Firing was made much easier when this arrester was later improved by bringing the exhaust nozzle up through the deflector and deflecting only the hot gasses.

John Abell stole the show at Toronto in 1881 with his exhibit of the first cross compound threshing engine ever built in Canada. This engine had one side crank and one centre crank set at right angles and Abell claimed a three horse power increase over the corresponding 12 hp single cylinder engine together with a 30% saving in fuel and predicted that the compound would soon be the leading engine in the field. Two years later he patented his first straw burning boiler to meet the requirements of the Manitoba trade calling it "Abell's Return Tubular Straw-Burning Boiler". This burner was located in front of the regular firebox and under the barrel of the boiler and was fed from either side through self closing straw chutes and air was admitted to the hot air chamber through damper controlled openings in the sidewalls. For firing with wood the straw doors and dampers were left closed and the regular fire door used.

In 1886 Abell built his first traction engine by adding steel rear drive wheels and steering controls to his standard Triumph portable engine. Abell's early tractions were driven by a friction belt from the main shaft to the countershaft. This belt was constructed by rivetting V-shaped wooden blocks to a leather back and ran in groved pulleys and was controlled by a tightener operated by a crank from the driver's platform. Two speeds were obtained by the use of different sized pulleys. Later belts had the wood blocks fastened to a steel or malleable back. The type of early reverse gear is not known but old timers say the eccentric was shifted across the shaft by a screw device. In the early 1890's the friction belt drive was discarded and the mounting of the engine reversed on the boiler to bring the belt wheel over to the right side and allow the countershaft to be driven by an intermediate gear. The Marsh reverse was used on the single cylinder tractions and the Woolf reverse on the cross compounds. In 1893, a gentleman from far off Smyrna, Asia Minor, was attracted by Abell's cross compound engines and ordered one specially built for his own use. This engine was rated at 45 hp and was very large for its time. Only one was built but Abell made full use of the pictures in his advertising.

In 1882 steel rails began to push out across the Western prairies and agricultural implement manufacturers envisioned the requirements of the millions of acres to be brought under cultivation. John Abell shared their enthusiasm and prepared to meet the expected demand for threshing machinery. For better shipping facilities he bought seven acres of land on the outskirts of Toronto, near Parkdale Station, and erected a large four story factory which he named The John Abell Engine and Machine Works and in 1886 moved his entire equipment to the new site.

With the outdating of the apron type separators no machine was designed to take the place of the "PARAGON". Instead, Abell appears to have secured the right to build the Battle Creek Advance in Canada and called them the TORONTO ADVANCE. These tried and proven separators sold well in the West but the old demon "bad water" bogged down the Triumph engines. Abell added a small bulbuous dome to his boilers to try to correct the trouble and introduced his Advance engines but the set-back placed him in financial difficulties and he was forced to incorporate as a limited company in 1894. Production did not cease at the big factory while John Abell struggled to regain his standing in the threshing world. There was still a demand for his engines in the East and the Toronto Advance separator continued a favourite. "LITTLE GIANT" and "VIBRATOR" separators and "VICTOR" clover hullers were manufactured under special arrangements with the holders of the United States patents and boilers of all kinds, feed mills and a number of agricultural implements were also built.

Scathingly critical of all who dared infringe on his patents but not above taking personal credit for the ideas of others, John Abell staunchly maintained the superiority of his machines in the most grandiloquent style and must be given full credit for his share in the development of threshing machinery in Canada.

The Sands of Time run out for all men and 1902 found this energetic man in his 80th year, with no family and in failing health, consequently the big Abell factory had to be sold. He lived until August 7th 1903, long enough to see his name would continue to be associated with threshing machinery for years to come.

AMERICAN-ABELL ENGINE & THRESHER CO., TORONTO.

In 1902 the Advance Thresher Company and the Minneapolis Threshing Machine Company jointly purchased the John Abell plant in Toronto, Ontario, and renamed it the American-Abell Engine & Thresher Company Limited. Although American owned the new company immediately adopted the policy of "Canadian-made goods for Canadian users" and continued without interruption to build the threshing machinery formerly manufactured by the John Abell Engine & Machine Works Company.

John Abell's "Toronto Advance" separator had

been well received in Western Canada and was improved by the addition of the Maplebay wind-stacker with wooden chute followed by the Cyclone gear driven blower with metal pipe and the parsons self-feeder. In the East, where all kinds of grain are grown, it was not so popular so, in the late 1890's, John Abell designed a new separator for Ontario. This machine featured a revolving grain carrier instead of the oscillating grain deck and had the straw decks made in four sections which were hung on pivots at the outer ends and given a nicely balanced motion by a center crank shaft connected to the inner ends.

About this time the press was featuring the exploit of Lance Corporal Findlater of the Gordon Highlanders who won the Victoria Cross at the assault on the Dargai Hill in Northern India, on October 20th 1897 where, shot through both legs, he sat through the hail of bullets and continued to cheer his hard pressed comrades with the stirring tune "cock o' the North" on his bagpipes. John Abell was impressed and named his new separator The "Cock o' the North" and incorporated the story and illustration of the epic feat in his catalogue. The American-Abell firm went further by adopting a game rooster on a stump as their trade mark and calling their output The "COCK O' THE NORTH" Line. All American-Abell engines had the figure of a rooster cast in the smoke box door.

For a few years the new owners continued to build the "Toronto Advance" and "Cock o' the North" separators and a full line of American-Abell "Advance" and "Compound" portable and traction engines. The simple engines had a spring mounting similar to the U.S. built "Advance" of the same period and were equipped with the Marsh reverse gear and double-ported balanced valve. For the Western trade the simple engines were built in the 14, 16, 18, 22 and 26 hp sizes and the cross-compounds 22 and 28 hp and were mounted on John Abell Patent End-Fed Straw-Burning Boilers. Two feet and a half of the flues extended back into the firebox of these boilers giving the engines, especially the compounds, a short stubby appearance. Those in the smaller sizes built for the East had regular wood-burning fireboxes and diamond top smoke stacks and looked better proportioned.

With the demand for more power for threshing and heavier engines for ploughing the American-Abell firm developed a line of sturdier engines of their own design. Familiarly known as "Cock o' the North", these sidemounted engines were built in the 16, 18 and 20 hp sizes with simple cylinder for the East and in the 22, 26 and 30 hp simple and 22, 28 and 40 hp compound sizes for the West. The dropped crown sheet on straw-burning boilers was discontinued after a few years but the John Abell patent idea of aiding combustion by admitting air through openings in the sidewalls was retained. Spring mounting was omitted and heavy gearing and flat spoked drive wheels used on all models. The Woolf single eccentric reverse gear and plain slide valve were adopted. Later a balanced valve was designed and the steam chest raised at an angle to give the valve stem and rod a straight line motion. Three experimental double simple engines were built and all compounds were of the cross-compound type with one side and one center crank set at right angles. The exhaust from the high pressure cylinder passed through a re-heater in the smoke box before entering the low pressure cylinder. Front or side tanks were mounted on ploughing engines if ordered.

In 1908 the first rearmounted engine was built, a 36 hp simple with drum type drivers so that water could be added to make more weight. Named after F. E. Kenaston, President of the Minneapolis Threshing Company at the time, it was shipped West and shown at the Winnipeg and Brandon Exhibitions then on to Regina where it was stored until the disastrous fire in November 1911 destroyed the American-Abell branch there. It was rebuilt the next year and sold. This experimental model was followed by many more rearmount ploughing engines built in two sizes. A 28 hp simple and a 32 hp cross-compound. The latter being one of the heaviest of North American traction engines having a shipping weight of 24 tons. Both these models had a novel steering arrangement designed to steer easier and relieve the boiler from the strain of jerking steering chains. Both standard front wheels were mounted close together in a yoke and the steering rod moved the roller bearing turntable by means of a worm and segment running in oil. Another feature was a power feed pump mounted below the level of the water tanks for positive gravity feed and driven from a crank on the intermediate gear.

In addition to the number, each "Cock o' the North" engine bore a name on its number plate according to its size. Some of these may be of interest. The 18 hp "Garfield"; 20 hp "Dewey"; 22 hp "Bobs" named after the Boer War general Lord Roberts; 26 hp "Dundonald" after a colourful British Admiral; 28 hp compound "Watt"; 30 hp simple "King" and 40 hp compound "Queen". The 28 hp rearmount was named "Bush" after S.O. Bush, Vice-President of the Advance Thresher Company and the 32 hp rearmount "Drummond" after the plant superintendent.

Along with its line of engines the American-Abell Company developed a new separator by combining the best features of the Toronto Advance and Cock o' the North machines. The new separator was named The "TORONTO COMBINATION" and proved itself a fitting companion for the American-Abell engines.

In December 1911 the M. Rumley Co. of La Porte, Indiana purchased two of the best known threshing machine plants in the U.S.A. - namely the Advance Thresher Co. and the Garr-Scott Company in order to handle the expected demand for the newly developed Rumley Oil Pull tractors.

Early the following year the now greatly enlarged M. Rumley Co. purchased the American-Abell plant in Toronto and renamed it the Canadian Rumley Co. Limited enabling them to supply the Canadian market with Rumley machinery from their Canadian plant.

Following this sale the manufacture of steam engines was discontinued and the well known "Cock o' the North" line disappeared. They built a total of nearly 2500 farm engines, the majority of which went to the Canadian West where The "Cock o' the North" Line was a famous name, sworn by and at as are the tractors of today.

John McCloskey was born in Ireland in 1847. At the age of 19 he came to Canada along with his parents, three sisters and five brothers. The family located in the bush near the tiny settlement of Oldcastle, about eleven miles from the present city of Windsor, Ontario. Here the parents and younger children immediately began the task of clearing the land and building a home while the older boys, who were trained mechanics, established a small carriage factory in the village.

In this shop John learned the trade of carriage maker and being mechanically minded he soon became an excellent workman and experienced no difficulty in finding employment where-ever he went. While working in the MacPherson factory in Fingal, Ontario, he became deeply interested in threshing machinery and, noting the problems facing the manufacturers of the new type vibrating machines that were replacing the older apron or canvas separators, he thought out a plan of balancing the motion of the straw deck and the grain shoe by means of a double throw cranks and constructed a working model which proved that he had discovered a solution to the problem of balance.

John McCloskey had his invention patented in 1881 and the London firm of Stevens, Turner and Burns began building the new machines for him and marketed them as the "CANADIAN THRESHER". Four years later the royalty rights were acquired by David Darvil & Company of London, Ontario, who manufactured them as the "McCLOSKEY THRESHER". Later still the Waterloo Manufacturing Co. built them for a short time as the "COUNTERBALANCE THRESHER".

While John McCloskey was busy in London supervising the building of the McCloskey separators and improving them with additional patents another threshing machine company was developing at Sarnia, Ontario. Here the Council of the fast growing border town were looking around for industries and, in 1881, induced J.F. Craig, who had been endeavouring to establish an agricultural implement factory in Strathroy, to move his works to Sarnia. Known as the Sarnia Agricultural Implement Association the new firm made reapers, mowers, ploughs, corn shellers etc. Its products were favourably received and for a few years the firm prospered. Ill-advised expansion in 1884 and an attempt to build and market binders forced the company into liquidation in 1886. The following year John Goodison, who had been general agent for the company, together with Geo. H. Samis purchased the interests and factory of the insolvent company and operated for a year, but under adverse circumstances, and were glad to enter into negotiations with the Sawyer and Massey Company of Hamilton, Ontario, for the sale of their interests. Operations were continued as usual and John Goodison was retained as manager by the Hamilton firm.

John Goodison was not satisfied with the new arrangement and late in 1889 acquired sole ownership of the concern. The days of Sawyer and Massey control convinced him of the future of the threshing machine industry and he wisely abandoned the manufacture of reapers and ploughs and concentrated on threshing machinery. For a while he called his factory the Tunnel City Thresher Works but soon changed it to the John Goodison Thresher Company. Meanwhile, the fame of the McCloskey thresher was spreading and in 1892 Mr. Goodison acquired the right to build these machines and persuaded John McCloskey to move to Sarnia and work in his factory. The years that followed saw the firm prospering and soon the Goodison "NEW McCLOSKEY" threshers were favourably known throughout both Eastern and Western Canada.

As the years passed the New McCloskey machines were fitted with the latest attachments. The Goodison firm was one of the earliest of Canadian manufacturers to build wind stackers. At the turn of the century they were fitting to their own and other makes of separators the Russel gear driven stacker. This was replaced about 1904 with the standard "Farmer's Friend" type of gearless, direct belted side stacker. In 1902 double decks replaced the tail rakes. Early self feeders were the Parsons, followed by the Goodison-Rich, the Ruth and finally the Goodison—Heineke. The Stewart patent rear cutting attachment was supplied for Eastern customers. In the early 1920's steel for frame was experimented with and by 1926 had completely replaced wood. The next improvement was the gradual adoption of self aligning, dust proof, ball bearings until the whole machine was so equipped. Mounted on rubber the late Goodisons looked much different to their early machines but inside doing the job of actual separation was the counterbalance motion invented by John McCloskey.

John McCloskey died of pneumonia in 1902 at the early age of fifty five leaving behind in his workshop several uncompleted models of inventions he had been working on. John Goodison died May 6th 1915.

The Goodison firm built no engines in the early days but supplied customers for complete outfits with the Waterous 17 hp "ONTARIO STANDARD" single cylinder engines for the East and the heavier double cylinder models for Western Canada. In 1902 they began to build a few portable engines in their own factory and two years later entered the traction field. By this time the experimental stage was over and the firm settled on the open bottom locomotive type boiler with high dome. Solid stub axles and heavy counter shaft bracket were bolted to the firebox and a side crank engine was mounted with the cylinder towards the smokebox. The Woolf single eccentric reverse gear was adopted and a lever controlled brake acted on a large drum cast on the inside of the intermediate gear. The clutch was internal expanding with two large metal shoes.

Only single cylinder, side mounted engines were built and the original design was never changed. In 1916 the Watson horizontal governor was adopted and late models had patent adjustable exhaust nozzles. Two injectors were standard equipment. Early engines were rated at 18 hp. A few 25 hp engines were supplied to customers who did sawmill work in addition to threshing but the 9 in x 10 in cylinder engine, rated at 22 hp with high pressure boiler, was the standard engine built for many years. The last new engine was built in 1927. The firm had a novel way of numbering their engines. The last numbers indicated the number of engines built in the year indicated by the first numbers, thus, Engine No. 1823 was the 23rd engine built in 1918.

The first boilers used on Goodison engines were built by The Waterous Engine Works in Brantford. In later years The Sawyer-Massey Company of Hamilton made boilers for them. Although Goodison machinery was extensively used in Western Canada the company never established a western branch. They did, however, establish sales agencies in the

United States and possibly sold more machines there than any other Canadian threshing machine company.

In 1920 Goodisons began selling Hart-Parr gas tractors and after the merger of 1928 became Canadian distributors of Oliver tractors and equipment. The expanding oil industry in Sarnia badly needed the adjacent Goodison property, in consequence the firm gave up the manufacture of separators about 1950.

ROBERT BELL ENGINE & THRESHER CO., SEAFORTH.

Robert Bell was born in June 1864 near the village of Hensall, Ontario. Close by was a water powered pioneer sawmill which fostered the growing boy's natural liking for machinery and enabled him, while still a young lad, to build a miniature sawmill of his own on his father's farm. In the early 1880's an attempt was made to grow sugar cane in the district and young Robert's first business venture was in 1883 when he and Wm. Dougall purchased a small steam engine from E. Leonard and Sons of London, Ontario to operate a mill for crushing the cane. The sugar cane idea proved a failure and Robert Bell moved the engine to Hensall and started a general repair shop.

Although a very successful general mechanic, Robert Bell was particularly interested in the local threshing engines and separators brought to his shop for repairs and overhaul and finally decided to try his luck in this promising manufacturing field. A locomotive type boiler was purchased from George White and Sons in London, Ontario and, enlisting the aid of John Finlayson, an experienced local carpenter, they designed and made patterns for a side crank engine to mount on the boiler. This first 14 hp portable steam engine was completed and sold to Wm. Jarrett of nearby Hills Green ready for the 1899 threshing season and proved a decided success. Two more were built and sold for the 1900 season. More orders came and a larger shop became a necessity. A suitable plant, complete with a small foundry was available in the nearby town of Seaforth so a move was made to the new location where the fast growing business, first known as the Bell and Finlayson Foundry, was incorporated as The Robert Bell Engine & Thresher Co. Limited in 1903.

Self propelled steam engines had become popular and Robert Bell needed them to fill his orders but had no time to design one. He had always been a keen admirer of the patent corrugated, self cleaning, wheels and this may have been the reason for his negotiating with the Port Huron Engine & Thresher Company of Port Huron, Mich. to build their engines in Canada. The first traction engine, a 14 hp was built in the Seaforth plant in 1901 and sold to J. Williamson of Walton, Ontario. These well proportioned side mounted engines with their long smoke box and corrugated rear wheels increased in size with the years but the original design was altered only in minor detail. Tandem compounds were mostly built at first but gradually the demand was for simple engines only. Their most popular engine in the East had a $9\frac{1}{4}$ in x 10 in cylinder and was rated as 21 hp. In later years a number of side mounted engines were built with 10 in x 10 in cylinder and rated as 24 hp. The boilers for these later engines were built with a flatter water bottom and had longer flues and a shorter smoke box. The firm made heavy road roller wheels to fit their side mounted engines and many owners purchased a set of these to enable them to use their engines to advantage before the threshing season opened.

In 1904 a branch office and warehouse was opened in Winnipeg and a few years later another in Saskatoon to take care of the growing Western trade. Robert Bell tried to cope with the fast growing Canadian West by equipping his boilers to burn straw and building the sidemounted engines in the 26 hp simple and 27 hp tandem compound sizes and greatly increasing the strength of the gearing but it soon became apparent that side mounted engines could not stand up to the heavy strain of plowing so he and John Finlayson set about to design a rear mounted type.

This new engine was thoroughly tested and came into production in 1912. It was designed to relieve the boiler of all gearing strain and consisted of an independent steel frame on which the crank shaft, intermediate gear shaft, counter shaft and rear axle were mounted. The high pressure boiler simply rested on cradles. All stud bolts and cap screws were eliminated and only one riveted bracket remained to support the cylinder. An open bottom firebox and heavy flat spoked English type drive wheels were adopted but the actual engine details including the improved Grime reverse gear and horizontal sliding friction clutch were not changed on the new engine. Two sizes were built, 30 hp with 11 in x 11 in cylinder and 26 hp with $10\frac{1}{2}$ in x 11 in cylinder. A 24 hp rearmounted engine with 10 in x 10 in cylinder and self cleaning wheels was designed for the Eastern trade but did not prove popular on account of its limited turning radius and awkwardness for firing with wood.

At the turn of the century Robert Bell experimented with a portable engine fitted with flywheel governor regulating the speed by a variable cut-off. This automatic engine worked well as a stationary engine and a number were sold for small electric light plants but it proved erratic on all but the most ideal of threshing settings. So sensitive was the governor that even gusts of wind would affect it.

In 1904 the Bell foundry was enlarged in order that grain separators could be built and the following year the firm introduced their new "IMPERIAL" threshing machine which was almost identical with the U.S. Avery "Yellow Fellow" built in Moline, Ill. and well liked in Western Canada. Now able to supply complete threshing outfits Robert Bell began to advertise his output as "The Imperial Line of Threshing Machinery". The first Imperial separators were designed for the Western trade and proved too heavy for use in Ontario barn threshing so a somewhat lighter machine had to be built for the East. With the advent of the gas tractors a still smaller separator called the "IMPERIAL JUNIOR" was designed. Improvements in the Imperial Junior included the adoption of a side shake shoe and the addition of a three way crank driving kicker rakes between the sections of the long perforated straw deck. All Bell threshing machines were fitted with the "Ruth" self feeder and "Farmer's Friend" gearless windstacker and the Stewart patent rear straw cutting attachment when desired.

The last new "Bell" steam traction engine (a 24 hp with 10 in x 10 in cylinder) was built in 1928 for Wm. Shortreed of Walton, Ontario, but steam engines continued to be rebuilt and repaired for some years after.

For a short while following World War I "Imperial" kerosene tractors were assembled at the Bell foundry. These tractors were built in the 20-35 and 25-45 hp sizes and were of conventional design with upright four cylinder motors cast in pairs.

Robert Bell died in 1934. His son Earl, with the able assistance of John Finlayson who had stuck by his father ever since their first venture with agricultural engines, carried on the business until the sudden death of Earl Bell in 1948. An only Bell grandson, who it was hoped would continue the family association with the business, was killed in World War II. The plant was sold but the new owners felt that the good name of Robert Bell should remain associated with the business which they are carrying on under the name of "Robert Bell Industries Limited".

HAGGERT BROTHERS MANUFACTURING CO., BRAMPTON.

On the Main Street of Brampton, Ontario, a handsome cairn was erected in 1958 by the Metropolitan Toronto and Region Conservation Authority to hold a bronze plaque bearing the following wording to honour a former citizen - "In 1849, John Haggert, who was soon joined by his two brothers began to manufacture agricultural implements about 300 yards north of this spot. As the small shop expanded, steam soon replaced horsepower. Seeders, reapers and other implements were developed and a threshing machine won medals in Canada and the United States and the "Practice with Science" award in Sydney, Australia. The Works continued to be an important industry in Brampton until 1891.

John Haggert was born in Paisley, Scotland, migrated to the United States where he served his engineers apprenticeship, then came to Canada. An inventor, designer and manufacturer, he was active in community life and served as first mayor of Brampton 1874 - 1877".

A Haggert threshing machine won second prize at the Provincial Exhibition in 1852. In 1871 the company shipped a thresher to Manitoba, the first to enter the Province. Roderick Cochrane a brother-in-law, joined the firm in 1870. A branch plant "Haggert and Cochrane Agricultural Implement Works" was established in St. Thomas in 1870.

Through advertisements in the farm magazines of the 1880's Haggert Bros. Manufacturing Co. of Brampton, Ontario invited the farmers to visit their exhibits at the various exhibitions to be held throughout the Province and, using the rather boastful and flowery words used by many manufacturers during those years, to examine their machines which include their New Style Reaper, their Tiger Sulkey Rake, their Patent Dustless Grain-Saving Separator which they describe as the Acme of Perfection, The Standard of Excellence, The Fastest Thresher Extant and Most Perfect Grain Cleaner also their "Cornell" portable steam engine, The Best, Strongest, Lightest, Simplest and most easily managed portable steam engine in the WORLD. This valuable invention in steam engines has been secured by Letters Patent to Haggert Bros. from the inventor Prof. J.E. Sweet of Cornell University, Ithaca, N.Y.

The Haggert Bros. portable engines were all of the locomotive boiler type with no steam dome and the governor mounted on the steam line between the boiler and the engine. Early pictures of their first attempts to build a traction engine show the traction tread and gearing bolted to the wooden rim and spokes of the rear wheels of a regular portable engine. In the November 1882 issue of the Farmer's Advocate an interesting account describes "the public testing in October 1882 at Brampton, Ontario,of what might be called the first steam plow used in Canada. This implement was made by Haggert Bros. for the QuAppelle Farm Syndicate and was drawn at the trial by a 25 hp double cylinder engine built on the same principle as a locomotive and can be started at any time no matter in what position the wheels are thus giving it a great advantage over the ordinary traction engine with one cylinder. The propelling power obtained by spur and bevel wheels geared direct from the main shaft to the hind wheels of the engine. Seven furrows were turned at once and the work done considered by practical farmers as excellent. These implements are doubtless destined to play an important part in the rapid settlement of the North West". Examination of a faded print of this early plowing outfit shows the engine to be of English manufacture.

The historic plaque indicates that the Haggert Bros. firm ceased operations in 1891. Several years later the business was acquired by J.M.Ross and his two sons A.H. and F.J. Ross. The sons held the positions of Secretary and Treasurer and the firm operated as J.M. Ross, Sons & Co. Limited. The new firm continued to build the well known "Cornell" portable and traction threshing engines in the 14, 16, 18, 20 and 22 hp sizes. In order to enable them to carry a full line of threshing machinery they entered into an agreement with the Garr-Scott and Company firm of Richmond, Indiana to build the well known "THREE WAY CRANK" large cylinder grain separators in Canada. Sometime in the early 1900's the City of St.Catherines offered concessions which Brampton felt they were unable to match. In consequence the J.M. Ross firm moved their machinery and business to a new location in St.Catherines where they continued to build their engines and separators for some years before they too ceased operations.

JOSEPH HALL MACHINE WORKS, OSHAWA.

Oldtimers frequently recalled "The first threshing machine I remember was made in Oshawa" and coupled with this statement would be "And what a heavy brute it was!" These old unmounted threshers were well and solidly built and their owners continued to use them long after the mounted machines came on the market. Loading and unloading these old threshers and the down horse-powers into and out of the high wheeled waggons then in use is remembered as the hardest part of threshing.

The history of these Oshawa threshing machines dates back to 1828 when Joseph Hall, a native of New Jersey, built a small thresher. His machine was considered quite a good one and he decided to begin the manufacture of threshers at Rochester, New York. Hall's threshers were of the open cylinder type and received favourable mention during the 1830's. Early in 1840 John A. Pitts, who with his brother Hiram A. of Winthrop, Maine, had invented the 'endless apron' separator in 1837, came to Rochester and joined up with Joseph Hall. Together, they built threshers of the Pitts type for two or three years and during this time the original Pitts machine was improved by extending the tailings elevator to deliver the tailings into the cylinder instead of on the apron. This improvement Hall patented in his own name and the resulting dissatisfaction broke up the partnership.

Joseph Hall continued to manufacture several hundred machines a year in his Rochester factory while John A. Pitts moved on to Springfield, Ohio, and then to Buffalo, N.Y. where he founded the large Buffalo-Pitts Company. Meanwhile the territory north of Lake Ontario was rapidly becoming settled and as the bush was cleared and the farms grew bigger a demand was created for threshing machines. The only place to procure these was south across the lake and with Rochester having direct shipping connection it was only natural that Joseph Hall got the bulk of the orders. His export trade grew so extensive that he decided to explore the possibility of starting a branch factory in Canada and thus supply the market more cheaply by eluding the customs duty.

Joseph Hall chose Oshawa, a town of growing importance on the north shore of Lake Ontario, as the site of his new venture. In 1851 the Oshawa manufacturing company of A.S. Whiting had been organized and a brick factory built in which scythes, hoes and other hand implements were made but the difficult times of 1857 caused it to shut down. The following year, 1858, Hall leased the idle factory and sent over from Rochester some of his best workmen along with Francis Wayland Glen, his future son-in-law, as manager to open the Canadian branch and set an objective of 100 machines to be ready before the 1859 harvest.

Before long Joseph Hall purchased the original building and built additional ones. After 1862 under the spirited management of F.W. Glen the Joseph Hall Manufacturing Company grew and prospered. Skilled craftsmen were brought in from England and Scotland and the United States. New lines were developed and before many years the firm was turning out such diverse equipment as turbine waterwheels, pumps, sawmills, printing presses and other heavy equipment in addition to their agricultural and threshing machinery.

The firm continued to build the Hall "BRITANNIA" threshing machines of the apron type for over 20 years improving and enlarging them as the years passed. With the demand for machines of the vibrating type Miller's "NEW MODEL" as manufactured by the C. Altman Co. of Canton, Ohio, was adopted. This separator was designed to combine the best features of the old apron and new vibrating machines and old testimonials indicate that it met with much approval.

Up to the mid 1870's horsepower driven threshers were built then a special machine for steam threshing was designed. This machine had a 36 in cylinder and a 42 in apron. A portable engine for driving it was obtained from Wood, Taber & Morse of Eaton, New York. In 1878 a boiler shop was built and the firm began to build portable engines after the same pattern in their own plant. These engines were of the round bottom locomotive boiler type with side crank engine mounted with cylinder to the firebox end and the belt wheel on the right hand side. Early engines had a long hinged smokestack with screen top. Later models had the McKenzie patent water spark-arrester. Besides portable engines, stationary engines of the Corliss type were built at the Oshawa factory.

Joseph Hall died at his Rochester home, June 7th 1865 in his 71st year. After his death the Oshawa plant continued under the management of F.W. Glen whose enterprise built the establishment into one of the foremost of its kind in Canada. In later years, however, he became engrossed in politics and was elected twice to represent the Oshawa district in parliament. He spent far too much time and money on this activity for his own or the company's good. A warning of events to come took place in 1885 when the name was changed to the Joseph Hall Machine Works and by the early part of the next year financial difficulties resulted in bankruptcy and the extensive Joseph Hall Works that had gained a wide reputation as leaders in their day in the production of mechanical equipment closed their doors on February 24th 1886.

Approximately 5000 threshing machines and 100 portable engines had been built at the Oshawa factory and the closing of the plant might have been serious for their owners had not Robert Woon, for many years accountant and secretary for F.W. Glen, realized the situation and gathering together all possible patterns, leased one of the foundry buildings and was thus able to furnish repair parts for former customers.

In 1894 Robert Woon formed a partnership with his son, purchased one of the original buildings and under the name of R. Woon & Company commenced to build "THE NEW OSHAWA CLOVER MILL" an improved model of the original huller as built by the Joseph Hall Manufacturing Company. These machines had a re-cleaning mill attached and later models had self-feeders and wind stackers. They enjoyed an excellent reputation for simplicity, ease of operation and rapid threshing and were produced in limited quantities until 1925.

PETER HAMILTON CO., PETERBOROUGH.

Peter Hamilton was born in 1841, a native of Peterborough. He grew up in his father's (James Hamilton) agricultural implement manufacturing business which started in 1848 and designed many of the implements. The company expanded and prospered and produced the ARISTOCRAT threshing separator. Peter Hamilton died in 1912. The business was carried on by his son James and was finally sold in 1955. The manufacture of agricultural implements had been suspended many years before.

E. LEONARD & SONS, LONDON.

Elijah Leonard was born at Syracuse, N.Y., September 10th 1814, a direct descendent of a long line of Leonards who had been engaged in the manufacture of iron in America ever since they came to Taunton, Mass. from Wales about the year 1652. Elijah's father came to Canada in 1829 to manage the VanNorman iron furnace located at Normandale, near Long Point on the north shore of Lake Erie in the district then known as Upper Canada. Young Elijah, with his mother and three brothers and two sisters, followed the next year travelling by canal boat to Buffalo and on to Long Point in a small sloop. At Normandale he learned the trade of moulding and a few years later decided to go into business for himself. In May 1834, a partnership was formed with a fellow moulder, Philip C. Van Brocklyn, and the village of St. Thomas about thirty miles west was selected for the establishment of a small furnace.

The St. Thomas venture failed through no fault of the partners. Unfortunately, it was launched in troublesome times. Political unrest was rife at the time and the rebellion that broke out in 1836-1837 brought business in Upper Canada almost to a standstill and inflicted great hardships on the early settlers. Leonard bought out Van Brocklin's interest but found he could not carry on in St. Thomas. The establishment of a military headquarters in the village of London, twenty miles north, caused a mild boom in that area and Elijah Leonard moved there in 1838 and immediately began the manufacture of mill gears, stoves, ploughs, sugar and potash kettles etc.

Machine tools were not available in this new country and many ingenious tools were made by Mr. Leonard and his workmen during the next few years. In 1845 they replaced the horsepower, located in the basement of the shop and operated by two horses, with the first steam engine built in Canada west of the Maritime Provinces. This engine had an eight inch cylinder with a 24 in stroke. The cylinder was mounted vertical with guides above. The piston rod worked upwards through the top of the cylinder and a forked connecting rod led backwards and downwards to the crankpin and shaft located immediately below the cylinder. Steam was carried from the boiler in cast iron pipes and was admitted to the engine by an ordinary stop cock. On the first trial of the engine the plug of the stop cock had not been properly secured and blew out badly frightening the many spectators. The engine ran nicely and continued to operate the Leonard Foundry until 1866 when it was damaged beyond repair in a fire that destroyed the original buildings. The success of this engine started Mr. Leonard off as an engine builder. Several more uprights were built before the horizontal type was developed. At first, boilers were bought in Buffalo and brought by schooner to Port Stanley and teamed inland but by 1848 Mr. Leonard had rigged up equipment enough to begin building his own boilers.

About this time a demand for threshing machines was met by the Leonard Foundry with a rather crude machine which was little more than a frame with a cylinder hung in it. Some improvements were added but a railway building fever struck the country and Mr. Leonard received important contracts for dump cars, road scrapers etc. and the threshing machines were dropped.

In 1875, Elijah Leonard took his two sons into partnership with him and the firm became known as E. Leonard & Sons. Two years later, Mr.Leonard patented a short ported slide valve. This slide valve was almost as long as the cylinder and reduced the length of the steam ports to a minimum. The valve was such a success that it was adopted on nine sizes from 6 to 50 hp and named the "Leonard Engine". The frame, cylinder and bearings of the Leonard Engine were cast in one piece making a solid, self contained engine, which met with ready sale and gave general satisfaction.

In the late 1870's a demand for farm engines sprang up and in 1879 the firm began building the Leonard Farm Engine which for many years enjoyed a large sale in Canada. The boilers of the Leonard Farm Engines were all of the locomotive type with water bottom and open back. The open back was covered with a casting holding the fire and ash pit doors and when removed made inspection and repairs easy and materially lengthened the firebox which was always an argument in favour of the return flue type of boiler. The engine was of the centre crank type, cast in a solid frame and mounted on the boiler with crank and belt wheel at the smoke box end. The patented short ported slide valve was used and a cross head pump and exhaust feed water heater were bolted to the engine frame. Later models had a hand feed pump for use when the engine was not running but this was discarded as soon as the inspirator and injector came on the market. Early farm engines had a long smoke stack topped with a dome shaped screen. Later a short stack fitted with a McKenzie Superior Spark Arrester was adopted in place of the long hinged one. These engines were built in 6, 8, 10 and 12 hp sizes. The smaller engines were sold mostly for light work in Nova Scotia, New Brunswick and Quebec while the heavier models were standard for Ontario and the Canadian North West.

In the mid 1880's the firm purchased the right to manufacture the Ball Automatic Engine in Canada. These engines had double ported balanced valves and the governor, consisting of weights and springs, was located in the flywheel and controlled the speed by variation in the cut-off instead of throttling the steam pressure. In 1888 a farm engine was built of this type but the results were disappointing. The shaking of the engine mounted on wheels disturbed the weights in the flywheel governor making it erratic in action. However, the Leonard-Ball Automatic Engine ran beautifully on a solid foundation and became a great favourite for all high speed work. The day of the electric light plant had arrived

and the firm, crowded with orders for high-speed engines, did not enter the traction engine field so the Leonard Farm Engine died with the demand for self propelled models.

Elijah Leonard took a great interest in public affairs and was first elected to represent London in Parliament in 1857 and was made a Senator at Confederation in 1867. He died in London, May 14th 1891. The company, incorporated in 1913 as E. Leonard and Sons Limited.

MACDONALD THRESHER CO., STRATFORD.

On a lovely autumn day early in October 1876 an auction sale was in progress on the farm of James Macdonald five miles south of Clinton, Ontario. While his father's stock and implements went to the highest bidders a 13 year old boy stood wistfully regarding the model threshing machine he had painstakinly constructed from a wooden box and odds and ends found around the farm. The little machine was complete to straw-carrier and was operated by a belt from the grindstone. Now, the family were moving and it had to be left behind. Realizing the situation, a neighbor boy, Michael Whitmore, came over and offered him fifteen cents - Peter Macdonald had built and sold his first machine in a lifetime devoted to the manufacture of threshing machinery.

The year before, Alex Macpherson, mechanic, and John P. Macdonald, book-keeper from the firm of Glasgow, Macpherson & Co. of Clinton, Ontario decided to start a threshing machine business of their own and chose Stratford, a railway centre 50 miles east, as the site of their business venture.

Running shy of capital to complete their factory they appealed to John P. Macdonald's brother James to sell his farm and go into partnership with them. The firm, known as Macdonald & Macpherson Company, built and sold without difficulty the 30 threshers they planned for 1877 and the success of their machines from the start assured increasing sales and prosperity for the company. These threshers were of the conventional apron or canvas type with side shake shoe. About 1880 an end shake shoe was adopted and four years later they placed on the market the first of their deck type separators. This machine was remarkably simple in design. The straw deck was hung on arms below the cylinder and was attached to a revolving crank at the back end. The resulting motion tossed the straw upwards and backwards with each revolution. In later years the deck was lengthened to replace the tail rakes but so efficient and easy running were the early models that the general design was never changed. Wind-stackers, self-feeders, baggers, weighers and rear cutting attachments were added as they came into general use.

The canvas type machines were called the "Standard" and were built as long as the demand for this type lasted. While the first deck type machine was being built a workman casually referred to it as the "DECKER". The name caught on and was adopted for the new type separator. The use of the name grew and before many years the firm's output was advertized as the "Decker" Line of Threshing Machinery.

Alex Macpherson did not live many years and after his death the two Macdonald brothers carried on the business as the Macdonald Manufacturing Company. Young Peter attended school in Stratford for two years then entered the Grand Trunk Railway Shops as an apprectice machinist. In addition to learning his trade, Peter's work on locomotives developed a deep and lasting interest in steam engines. A few years later he and his brother John K. Macdonald joined their father and uncle in the threshing machine business where Peter's training and interest was directed towards the mechanical end while his brother just as naturally favoured working with wood.

In the early 1890's John P. Macdonald's health and other interests resulted in his withdrawal leaving James and his two sons to carry on the business. James Macdonald died in December 1911. Born in Scotland, he was only a few months old when his family had crossed the ocean to Nova Scotia in 1831. John P. was the first child born during the 14 years the Macdonald family remained in Nova Scotia before moving on to the vicinity of Brucefield in what is now the Province of Ontario. After the death of James Macdonald the firm was re-organized as The Macdonald Thresher Company Limited and a modern factory was built at the eastern outskirts of Stratford to take care of their increasing output.

No engines were built by the Macdonald firm in the early years but horse-powers of the Pitts type, both down and mounted, up to the 12 hp size were built and the company sold John Abell and C. Norsworthy portable engines to customers who wanted complete outfits. The demand for traction engines finally persuaded the firm to begin their manufacture and in 1905 arrangements were made with the A.D. Baker Company of Swanton, Ohio, to build the well known "Baker" traction engines in Canada. The first of these engines in the 18 hp size were built the next year. The 20 and 22 hp sizes followed and in 1912 a special 25 hp engine was developed to meet the demand for heavier engines from Western Canada.

Early "Decker" engines were built the same as the 1906 models of the A.D. Baker engines. Later ones had minor changes including a longer connecting rod and Decker valve gear. In this reverse gear the eccentric rod was lengthened and the valve motion taken from the extreme end through the angle rocker arm placed ahead towards the steam chest, an arrangement requiring only a short valve stem rod. In 1913 the first piston valve engines were built making the "Decker" one of the few if not the only, piston valve traction engine built in Canada.

All "Decker" engines were rearmounted, without springs, on round closed bottom boilers with the exception of the 25 hp ploughing engine which had an open bottom type boiler and a full width intermediate gear shaft above the boiler. An old employee tells with amusement about the time the first big ploughing engine was completed and ready to be taken out into the yard for testing under steam only to find it was an inch and a half too wide to go through the door. The Macdonald firm had no boiler shop. Their first boilers were built by the Clinton Thresher Co. and after the Clinton foundry burned in 1907 the majority of their boilers were built by the John Inglis Co. of Toronto, Ontario.

Allan Macdonald stated "in 1906, our company branched out and commenced the manufacture of

steam engines, which materially aided the sale of our threshers. Then the war came along in 1914. Farms no longer had rail fences to burn, coal was dear and it was a difficult problem to supply 20 barrels of water for an engine every day.."

During World War I the firm used much of its equipment for the manufacture of artillery shells. After the war they dropped the manufacture of steam engines and concentrated on gasoline tractors. The unfortunate choice of a variable speed friction drive that was excellent in theory but would not stand up to hard usage proved a serious financial hardship and in 1923 the firm sold out to the Brooks Steam Car Company who considered the plant and location ideal for their requirements.

Peter Macdonald lived until November 22nd 1950 and remained one of the old school of steam lovers who never could reconcile himself to the gas age. He was a great admirer of the Walschart valve gear as used on locomotives and in his spare time in later years constructed a reverse gear of this type for use on traction engines. Unfortunately, the fate of the farm steamer had been sealed and his valve gear never had a trial.

MACPHERSON, GLASGOW & CO., FINGAL.

Being almost completely surrounded by water, it was only natural that the early settlement of Upper Canada, now the Province of Ontario, should begin at the lake shores and river banks and gradually develop inland.

Daniel MacPherson first saw the light of day at Helmsdale, Sutherland, Scotland, and when he was only three years old his parents decided to emigrate and try their fortune in the New World. In 1819 the family arrived by boat at Port Talbot and located in the settlement being developed by Col. Talbot on the north shore of Lake Erie. Here young Daniel grew up and married the daughter of another pioneer family by the name of Ferguson. To the union were born eight sons and one daughter.

Inheriting much mechanical ability, Daniel was always "fixin' things" as a boy and when he grew older he made up his mind to manufacture implements to meet the needs of the pioneer settlers. In 1847 he made a trip to Lockport, New York, to endeavour to secure experienced workmen. Here, he enlisted the services of William Glasgow, a woodworker, and Metthias Hovey an ironworker and the following year, 1848, they built a small shop and foundry in the nearby village of Fingal, Ontario, and began the manufacture of pioneer tools and implements of many kinds.

The firm was called MacPherson, Glasgow & Co. Their products met with ready sale and before many years the small shop had grown into an extensive establishment. Meanwhile roads were being built inland and settlers following in large numbers. To supply their needs Daniel MacPherson chose the village of Clinton, 60 miles north in the centre of the fast developing Huron Tract, as the location for a branch factory. In 1861 he had his new establishment built in Clinton and the following year sent William Glasgow, his own son D.F. (Ferg) MacPherson and Mr. Hovey's son Charles to manage it. The branch plant assumed the name Glasgow, PacPherson & Co. the reverse of the parent title.

Both factories built ploughs, cultivators, straw-cutters, grain crushers etc. and the Fingal plant experimented with threshing machinery until they perfected the "CLIMAX" apron type thresher in 1869. This machine met with early success and the demand caused both plants to concentrate on the production of horsepowers and threshing machines. The first shipment of 12 Climax machines was made to Manitoba in 1876. The following year they were improved by the adoption of an end shake shoe and the "End Shake Climax" continued in general favour for many years. With the advent of the vibrator type machines the right to manufacture the "Minnesota Chief" separator in Canada was acquired from Seymour, Sabin & Co., Sillwater, Minn. This machine combined the best points of the vibrator and apron threshers. Twenty-seven were built in 1879 and their production continued and increased along with the Climax machines.

It is believed that no steam engines were built at the Fingal plant although an old sales record shows 12 were sold in 1876. The following is recorded in the 1877 Historical Atlas of Elgin County "Their "MONITOR" steam engine has been awarded first prize at the N.Y. State Fair, Rochester, 1874; Eastern N.Y. Fair, Albany, 1875; N.Y. State Fair, Elmira, 1875; and Provincial Exhibition, Hamilton, Ont. 1876. For durability, convenience and economy it has no equal, and it is lightest for its capacity of any engine made. It is so constructed as to be turned or cramped as short as a city hack, and requires no levelling. blocking or staking. This engine can be set and steam raised in less time than it takes alone to set a horizontal engine. The boiler is upright and the smoke stack is provided with a perfect spark arrester, thereby insuring safety from loss by fire." In all probability the engines referred to were built in the United States. No records exist to show the extent of these importations and company advertisements in farm journals of the early 1880's do not mention steam engines.

Any consideration of building engines at the branch factory was squelched by the explosion of the first steam engine brought into the district. This tragic accident occurred January 21st 1880 about four miles south of Clinton. The boiler was of the horizontal type built in Brampton, Ont. and the explosion, believed to have been caused by low water, killed one man and seriously injured a number of others who had gathered to see the much talked about machine work. Needless to say, it was many years before another steam engine ventured into the district.

Following the death of William Glasgow in 1882, the two establishments became more or less independent. In Fingal Daniel MacPherson and Metthias Hovey carried on as MacPherson & Co. and continued to build the "End Shake Climax" as long as the demand for an apron type lasted. A new separator which they named the "CHALLENGE" was developed and perfected for the Eastern trade and the well known Battle Creek "Advance" separators were built for their Western customers. Daniel MacPherson died May 25th 1895 in his 79th year. After his death his sons John and Edward continued the business for two years then sold all their patterns to the firm of George White & Sons of London, Ont. who continued to build the well known "Challenge" separators for many years. Metthias Hovey, the third member of the original partners, died at Fingal, August 19th 1903 at the age of 87.

After the death of Mr. Glasgow, W.W. Farran entered the firm at the Clinton plant and along with D.F. MacPherson and Charles Hovey continued to operate as Farran, MacPherson & Hovey. The production of "End Shake Climax" and "Minnesota Chief" threshers for steam or horsepower was continued without a break until they were gradually replaced by a newer machine which the firm named the "MONARCH" separator. Mr. Farran left the firm about 1890 and Mr. MacPherson and Mr. Hovey carried on as MacPherson & Hovey Co.

The beginning of the century found the firm with out-dated equipment trying to compete with firms using the latest in tools and machinery. With the prospects of the threshing machine industry never better, the results were discouraging. Realizing the situation, a group of six Clinton business men organized as The Clinton Thresher Co. Limited and, in 1902, took over the plant, installed new machinery, enlarged the foundry and built an up-to-date boiler shop. The new company continued to build the "Monarch" separator which had been on the market for over 15 years. It was built in the 32 and 36 in cylinder sizes with four body widths up to 60 inches and featured a series of lifting fingers and kicker forks over the straw deck. As the demand came for wind stackers and self feeders they were added and plans were made to incoporate the Stewart patent rear end straw cutting attachment.

With the forming of the new company arrangements were made with the Marion Manufacturing Co. Marion, Ohio, to build their well known "Leader" threshing engines in Canada. These engines were of the open bottom locomotive boiler type with simple side crank engines mounted with the cylinder at the smoke box end. These traction engines were sidemounted and built in two sizes. Eighteen hp with 8 x 12 in cylinder for Ontario and 20 hp with $8\frac{1}{2}$ x 12 in cylinder for Western Canada. The reverse gear was of the shifting eccentric type, the flat spiral shifting device revolving with the crank shaft.

Tragedy struck swiftly Monday morning, May 13th 1907. Sparks from a newly lighted forge fire blew into an opened door and ignited the pile of shavings around a planer. Fanned by a wind of gale proportions the plant was an inferno in a matter of seconds and the employees were unable to save any of the finished or partly completed separators or engines. Nearby buildings caught fire and only with the help of firefighting apparatus from neighboring towns were the spreading flames brought under control.

Not more than 50 "Leader" engines were built. They were well adapted to Canadian conditions and many gave long and excellent service. The Bell Engine & Thresher Co. of Seaforth undertook to supply repairs for "Monarch" separators after the fire.

With the complete loss of plant, machinery and patterns the firm were unable to recover from the stunning blow. The demon "fire" had destroyed in minutes what had taken years to build.

MOUNT FOREST FOUNDRY CO., MOUNT FOREST.

The Mount Forest foundry was established about 1859 by Robert Kilgour, one of the pioneers of Mount Forest. He was born in Scotland and came to Mount Forest from Blenheim Township, Ontario. Kilgour manufactured chiefly agricultural implements and employed two or three persons. Two years after operations were begun the factory was destroyed by fire. Rebuilding was commenced at once and within a few months the plant was again in operation. The new factory comprised several buildings including a machine shop, show room, paint and pattern shops. During the time the business was operated by Robert Kilgour and sons. The Eclipse Machine, either a single or combined reaper and mower, was his leading specialty.

The Kilgours were succeeded by Archibald Filshie a native of Old Kilpatrick, Scotland, who came to Canada in 1869 and who had operated a foundry at Elora for 15 years. Mr. Filshie took over the Kilgour Foundry in January 1889 and moved to Mount Forest with his wife and family of seven children.

He carried on a general foundry business, manufacturing plows, gang plows, and other articles, but his specialty was a threshing machine marketed under the name of "FAVOURITE" which became popular in Ontario and Western Canada.

The business prospered over the years but due to failing health he retired in 1907. The business was sold to George L. Ernst and John J. Ernst, two of his employees, who had come to Mount Forest with him from Elora. They operated under the name of Ernst Brothers in much the same manner as Mr. Filshie and the "Favourite" thresher machine continued to be their specialty.

The Ernst Brothers retired in 1939 and the business was re-organized as a limited liability Company under the former name of Ernst Brothers and operated until 1964.

NEW HAMBURG MANUFACTURING CO., NEW HAMBURG.

Samuel Merner was born in Switzerland in 1823 and emigrated to Canada in 1837 along with his father's family. The Merners settled on a farm two miles from New Hamburg, a village on the Nith River in Waterloo County that had been established by hardy pioneers from the United States familiarly known as "Pennsylvania Dutch" whose ancestral homes had been along the Rhine River from Switzerland to the North Sea.

After learning the blacksmith trade in the nearby village of Preston, Samuel Merner opened a shop in New Hamburg in 1844 and his busy anvil was soon shaping pioneer tools needed for clearing the land and building homes. Merner's shop grew and from it came some of the implements required for tilling the soil. Samuel Merner's eldest son, Simson worked with his father and carried on the business after his death extending it to include the manufacture of a threshing machine that was little more than an open cylinder and the tread power required to drive it.

John Beam, a mechanically-minded thresher-

farmer living near Baden, Ontario, worked out an idea for balancing the deck motion of a threshing machine driven by means of crank shafts controlled by two spur gears on the outside of the separator. Simson Merner improved his small thresher by using John Beam's patent deck arrangement and built "Pitt's" improved sweep horse powers to drive them. Later, he built a boiler shop and began the manufacture of portable steam engines and fitted them and his "HAMBURG" separators to be driven with an endless rope. This rope drive had a number of advantages but required at least a 20 in pulley on the separator. To get the necessary cylinder speed it was driven by a large spur gear mounted on a shaft that crossed the separator in front of the cylinder. To deaden the roar of this gear and pinion, the teeth were usually made of wood.

By the mid-1890's Simson Merner was turning out a limited number of very efficient portable engines and separators. A group of local business men, seeing the excellent prospects for such an industry, came to his aid financially and, in 1897, organized the New Hamburg Manufacturing Company Limited and induced Werner Brodrecht, manager of the Waterloo Manufacturing Company since 1888, to come to New Hamburg and be General Manager of the new firm. Brodrecht brought with him his many years of experience in the manufacture of threshing machinery and his ability to design a satisfactory traction engine. The plant was badly damaged by fire in 1901 but the prospects of expanding markets with the opening up of the Canadian West prompted the company to rebuild and enlarge their factory.

"Hamburg" portable and traction engines were all of the open bottom locomotive type with side crank engine mounted with cylinder at the smoke-box end. Steam was drawn from a drypipe extending to the rear where the shell was an inch or two higher than the barrel of the boiler. This boiler design had the effect of making their engines look bigger from the rear. All traction engines had coil springs in the brackets of side mountings and were fitted with the Woolf single eccentric reverse gear and expanding friction clutch with three large wooden shoes. Only simple engines were built and the Gardiner governor was standard equipment. Wood burning engines for the East were built in the 16, 18 and 20 hp sizes and all had a $10\frac{1}{4}$ in stroke. Straw burning engines for the West were built in the 22 and 25 hp sizes with 9in x 11in and $9\frac{1}{2}$in x 11in cylinders. Early engines had the popular hinged diamond-top smoke stack or a straight stack if preferred. A distinctive, two piece cast iron tapered smoke stack with a short descending spark reservoir pipe was designed and used on engines built after 1904.

Although the new firm continued to build Merner's "Hamburg" separators, a new machine was designed and built in two models. For the Eastern trade they built the "ONTARIO CHIEF". This machine had balanced straw decks built with front and rear sections and driven by a crank-shaft located in the centre. A somewhat heavier machine built on the same principle and called the "PRAIRIE CHIEF" supplied the Western market. Both machines had a side shake shoe.

The company stressed simplicity and durability in their advertizing and kept abreast of the times with the latest in labour saving improvements on their machines and claimed to be the first firm in Canada to place on the market a pneumatic chaff blower. Before good drive belts were available they recommended the rope drive. Their first straw blowers were called the "Maplebay Wind Stacker" and featured a gearless twin fan so arranged that the straw fell into the current of air without touching the fan blades. About 1904 the conventional "Farmer's Friend" blower was adopted. The "Hawkeye" self feeder was fitted and a Stewart patent rear straw-cutter supplied if required.

Undoubtedly, the coveted Western market brought an untimely end to the "Hamburg" threshing machinery. The firm made the mistake of failing to establish a branch office in Western Canada, preferring to transact all business from New Hamburg. Machines were built and sold but collections were slow, and too often bad, forcing the New Hamburg Manufacturing Co. to close down late in 1914.

Two years later, the Dominion Thresher Company Limited, was formed to revive the business. Two new separators were built. The "Ontario Special" with a 28 in cylinder and the smaller "Grain Grower's Special" with a 24 in cylinder. Quite a few self feeders called the "J.R.E. Special" were built and sold for attaching to any make of separator and some steam engines were repaired and rebuilt but post-war circumstances forced the company to cease operations in the early 1920's thus ending nearly eighty years of service to the community and the development of Canadian agriculture by the business founded by Samuel Merner.

C. NORSWORTHY & CO., ST. THOMAS.

Charles Norseworthy was born in Whidicombe, Devonshire, England, and emigrated to Canada as a young man. He settled in London, Ontario where he learned the machinist trade. The next mention of Chas. Norseworthy is in the Lambton County Centennial History which records that, in the 1850's, the thriving new community of Arkona possessed nearly 20 manufacturing concerns in addition to stores, hotels and churches. Outstanding among the industries was the foundry of Champion and Norseworthy, manufacturing reaping, mowing and threshing machines, plows, cultivators, mill gearing and castings of all kinds.

Then we find the History of Elgin County recording that in the year 1871 C. Norseworthy & Co. purchased the Red Foundry which produced farm implements located at the corner of Centre and Metcalf Streets in St. Thomas, which they have enlarged and modernized with new and superior machinery and continued to make farm implements. The line was gradually dropped and the company drifted into the manufacture of engines and boilers about 1880. It is further stated that Chas. Norseworthy is a practical machinist and has followed his occupation as an iron worker for the past twenty five years. John C. Lindop, the other member of the firm, is a native of St. Thomas and well known as a faithful and capable business man. The firm carried on with the manufacture of agricultural machinery and a wide variety of castings and articles badly needed by the community in those times.

Just when they began the manufacture of portable steam engines is not recorded but advertisements in the 1880's mention them and the Macdonald Manufacturing Co. of Stratford picture one in their catalogues stating that they were the best on the market and would be supplied along with their own "Standard" or "Decker" thresher to anyone desiring

a complete threshing outfit. These Norseworthy portable engines were all of the return flue type with the smoke stack and cylinder at the rear of the boiler. For the Western market the firm built a patented straw burner in which the straw used for fuel was burned in an attached but separate furnace allowing only the hot gasses to pass through the firebox and tubes of the boiler.

Chas. Norseworthy died in the early 1890's. His partner carried on for a few years then the business was sold to a new firm headed by Messrs Spitsig, Barbrick and Hauck. The new company were so busy with the manufacture of stoves that they never started into the engine business and the well liked old Norseworthy portable threshing engines soon became only a memory to those who had owned or operated one of them.

PARK BROTHERS, CHATHAM.

David Park was born in Scotland in 1831 and emigrated to Canada in 1866. After a brief stop at Hamilton he settled at Chatham and became foreman in a machine shop for Hyslop & Ronald. He went to Michigan in 1873 but returned in 1877 to buy the Hyslop business which he operated until 1884 when he sold it to his three sons - Archibald, David and John. A new machine shop was built in 1884 and they employed 35 men.

The Chatham Engine Works manufactured portable and traction agricultural engines and portable saw mills in the early 1900's.

N. C. PETERSON & SONS ENGINE WORKS, SARNIA.

Norris Conrad Peterson, of U.E. Loyalist stock was born at Smith's Falls, Ontario, May 13th 1837. As a boy he learned the blacksmith trade and, in 1857 he journeyed westward to the then frontier town of Sarnia,Ontario, where he established a blacksmith shop at the corner of George and Victoria Streets. His business grew and a small foundry was added for the production of castings. Later, a machine shop and boiler shop were added. Two sons, James Norris and William Conrad, entered the firm when they grew up and the foundry became known as the N. C. Peterson and Sons Engine Works. In 1884 the first Peterson portable steam engines were built followed soon after by their first traction engines. These were wood burning engines of the round water bottom locomotive type. For a straw burning engine they later switched to the rear mounted return flue type as more satisfactory.

N. C. Peterson decided to retire at the turn of the century and his sons felt that, as future sales were most likely to be in the fast opening Canadian North West, it would be sensible to move closer to this market. Accordingly, in 1901, they closed the Sarnia plant and shipped all their machinery and equipment along with several newly built straw burning engines to Winnipeg, Manitoba, where they established the Peterson Foundry and Machine Works. Winnipeg, in those days, had growing pains and gave the new foundry so many orders for municipal castings that they couldn't find time to get back into the engine building business. When they were finally able to consider it the days of the steam threshing engines were numbered.

No Peterson engines were built in Winnipeg but one of the Sarnia built engines was carefully retained in their shop for a pattern. Finally, in the early 1960's the Manitoba Agricultural Museum at Austin, Manitoba, secured it as one of their treasured exhibits of pioneer power. Incidentally, Petersons used the well known Marsh reverse gear on their traction engines and one of their advertized features was something of a novelty in that they piped the cylinder drains into the exhaust pipe in order that the escaping steam would not frighten horses.

J. M. ROSS, SONS & CO., BRAMPTON.

See Haggert Bros. Mfg. Co., Brampton on page 7.

L. D. SAWYER & CO., HAMILTON.

When John Fisher came from New York State in 1835 and built a small shop in the pioneer hamlet of Hamilton at the western tip of Lake Ontario, he established an industrial enterprise that was destined to become one of the largest threshing machinery industries in Canada. His shop was small and his tools few but Fisher was an enterprising man and the following year (1836) he constructed the first threshing machine ever built in Canada. Although crude, it worked well and excited much interest amongst the settlers who had only the flail to beat out their grain.

Realizing the possibilities but lacking capital, Fisher appealed to his cousin, Dr. Calvin McQuesten of Lockport, N.Y., to enter into partnership with him. McQuesten proved an able executive and under his management the firm of Fisher and McQuesten prospered. The original threshing machine was improved and other lines were added. In the early 1840's L. D. Sawyer and two brothers, nephews of McQuesten, came to work for their uncle and, as the partners grew older, gradually assumed control of the business. After the death of John Fisher in 1856 the firm's name was changed to L.D. Sawyer and Company. Their factory, known as the Hamilton Agricultural Works, turned out reapers, mowers and other agricultural implements in addition to separators, tread mills and horse powers. Early in the 1880's they began to build portable steam engines and, in 1887, added horse drawn road machinery to their output and became the Canadian agents for Aveling & Porter road rollers.

During the year 1889 Hart A. Massey, Walter E. H. Massey and Chester D. Massey of Toronto purchased a 40 percent interest in the L.D. Sawyer

firm. In the reorganization the name was changed to the Sawyer and Massey Company Limited. Although there was no corporate relationship between the new Company and the Massey-Harris firm , their sales forces worked amiably together in the distribution of threshing machinery in Canada. Differences arose with the advent of the gas tractor and when the Hamilton firm moved to greatly increase the output of steam engines in 1910 the Masseys withdrew their interests. In this re-organization the firm's name was changed to the "Sawyer-Massey Company Limited" and the following year the new circular two word trade mark appeared on all their machines. Beginning in 1912 all their steam engines showed this new two word trade marke "SAWYER-MASSEY" in large bold letters on the smoke box door.

A line of progressive changes and improvements marked the threshing machinery produced by this pioneer Canadian firm. Threshers patterned after the well known "Pitts" endless apron type followed the early open cylinder machines. Their first moving deck machines appeared in the late 1870's and were called the "GRAIN SAVER". Advertising illustrations of these machines show them to be almost identical with the "Vibrator" separators built by Nicols and Shepherd of Battle Creek, Mich., which featured long balanced straw and grain decks and six sets of lifting fingers which thoroughly shook the straw as they worked it to the rear of the machine. The "Grain Saver" slowly established the superior qualities of the vibrating deck separator over the endless apron type which had become popular with both farmers and threshermen for many years.

Although still upholding the merits of the Grain Saver the L.D. Sawyer & Company catalogue for 1887 introduced a new vibrating type separator called the "PEERLESS". This new separator, invented and patented in 1885-6, had both decks built in forward and upward motion through a pitman driven rocker shaft. Although the "Peerless" became the firm's standard product a variety of other models were developed to suit the purchaser's requirements. A sturdier model of the Peerless called the "Great West" was built expressly for the Western trade. These heavy machines were built in sizes up to 40 in cylinder width. For the very small farmer with a one or two horse tread mill a small overshot cylinder type called the "NEW ONTARIO" was built. For those using a small sweep type horse power they built a larger hand fed separator called the "ECLIPSE" and for those desiring a small separator fitted with feeder and straw blower a model called the "DAISY" was available. A very efficient clover huller was also built by Sawyer-Massey and in later years, to accommodate the owners of small gas tractors, they built two separators in the 22 in and 28 in cylinder size which they simply called their No.1 and No.2 Threshers.

The Sawyer-Massey firm always kept abreast of the times and added self feeders, straw blowers, grain elevators and weighers as they were invented. At the turn of the century it was common practice with Ontario threshermen to cut the straw by running the sheaves through a cutting box placed in front of the separator. With this idea in mind, John Richmond of Blyth, Ontario, built and patented a separator with a straw cutter located in front of the cylinder. In 1905 Sawyer & Massey purchased the patent and spent much time and money trying to perfect the idea but finally gave it up and developed a straw cutting device that fitted on the rear of the separator similar to the "Stewart" patent cutter.

To furnish power to operate their threshing machines, the firm early began the construction of tread powers, enlarging them to the two and three horse size as demand required. They also built the sweep horse powers of the improved "Pitts" type from two to the twleve horse size, both down and mounted on wheels.

By the mid 1880's the firm was turning out the first of their popular "L.D.S." portable engines. This engine, named after L.D.Sawyer, was of the return flue type with dome and full water front. The engine was mounted at the rear of the short, broad boiler with the belt wheel on the right hand side. The smoke stack was hinged in the centre of a bowl shaped spark arrester. A few years later the efficient "L.D.S." appeared as a traction engine. To allow for the gearing and tractions wheels, the boiler was reduced four inches in diameter behind the combustion chamber thus lessening the width and weight of the engine and improving its steaming qualities. The firm claimed to be the originators of this type of return flue boiler construction. All spur gearing was used including the differential. The double eccentric link reverse gear was adopted and a friction clutch added. For straw burning engines the water front was replaced by a door and baffle plate in order that the clinkers could be readily removed from the flue sheet.

The "L.D.S." was a very efficient and satisfactory portable engine but public preference for the locomotive type traction engine caused the firm the change their design in the mid 1890's. The open bottom, locomotive type boiler without dome was adopted and hundreds of little 13 hp, single cylinder, side mounted engines were built around the turn of the century. Often spoken of by their owners as "dandy little engines" they fired and handled easily and had plenty of power for straw carrier separators but failed with the advent of the straw blower. In order to increase the power and hold down the weight on account of bridges and culverts tandem compound engines were mounted on the same size boiler but they did not prove a success. Soon Sawyer & Massey were turning out 17 hp and 20 hp engines of the same side mounted design for the Eastern market. Domes were added and the straight smoke stack changed to a slightly tapering one and the Diamond Spark Arrester with its cone top and spark reservoir pipe leading down to the side of the smoke box. A two speed road gear was designed and fitted if specially requisitioned. The double eccentric link reverse gear continued to be used on all single cylinder engines until 1908 when the "Woods Patent" single eccentric valve gear was adopted. All tandem compound engines, both small and large,were fitted with the Woolf reverse gear. The Waters governors were used on all portable and traction engines.

The Western Canada market was not overlooked and a large warehouse was constructed in Regina to supply the prairie needs. Twenty-two hp and 25 hp sidemounted engines with heavier gearing were first built for the Canadian West. To meet the demand for a heavy plowing engine a rearmounted type was designed and built in the 22 hp, 25 hp and 35 hp simple cylinder and 27 hp and 30 hp tandem compound sizes. Except for the re-arrangement of the gearing, the omission of springs and the adoption of a heavier friction clutch both types of engines were practically the same.

Following the Winnipeg International Motor Plowing Contests, in which Sawyer-Massey made a

creditable showing with both its steam and gas entries, they became the only Canadian manufacturer to adopt the idea of rating steam traction and portable engines by their brake horse power as pioneered by the J.I. Case Threshing Machine Company of Racine,Wisconsin. In 1914 Sawyer-Massey began rating the old 17 hp as 51 hp and the 20 hp as 60 hp. The 22 hp simple became 68 hp and the 25 hp simple 76 hp. The 27 and 30 hp tandem compounds were raised to 87 and 100 hp and the 35 hp simple was listed as 115 hp.

The Sawyer-Massey firm did not overlook the gasoline engine, and seemingly worked backwards at the idea by building their first gas tractors for the West in the 22 - 45 hp size using the steam engine traction wheels and gearing and mounting a slow speed vertical four-cylinder engine lengthwise of the frame and driving the belt wheel and transmission through a bevel gear. Succeeding models were built in the smaller sizes but retained the upright slow speed motor and the same general design.

During World War I, the Sawyer-Massey firm went whole heartedly into war work, handling large artillery shell contracts and making many steam road wagon engines for Great Britain. Post war conditions in the threshing machinery line caused the firm to concentrate their efforts on the production of road rollers, rock crushers, power graders and other road building machinery. They did, however, for a year or two continue to build a number of the small 11-22 and 17-34 gas tractors and the corresponding No.1 and No.2 grain separators also a limited number of 17 hp and 20 hp steam traction engines. These later steamers were built with the old double eccentric linkg reverse gear, and the "Gould" balanced valve.

SHARMAN AGRICULTURAL WORKS, STRATFORD.

John Sharman, a native of Bedfordshire, England arrived in what is now the City of Stratford, Ontario, July 10th 1834. A blacksmith by trade, he built a small shop and became the first blacksmith in the County of Perth. His eldest son, Henry, was the first white child born within the present city limits and his third son, Joseph, built a small shop on Birmingham Street near the railway tracks where he began the manufacture of various agricultural machine.s His factory grew and prospered and soon became known as The Stratford Agricultural Works, Joseph Sharman, Proprietor. The August 1, 1864 issue of Ontario Farmer states that Joseph Sharman entered a reaping machine in the Provincial Reaping Match held near Dundas on July 20th 1864. The December 1869 issue of the same magazine shows an illustration of "THE LITTLE GIANT" thresher and separator manufactured by Joseph Sharman of Stratford, Ontario.

In 1870 he apparently took into partnership a Mr. Foster as the advertisements appearing in farm magazines for the next ten years all read Sharman & Foster Mfg. Co., Stratford, Ont. Huron Pioneer Museum, Goderich, Ont. is fortunate in having on display a well preserved Sharman & Foster threshing separator of this period. It is mounted on two wheels and designed to be driven by a tread-mill or sweep horse power commonly used at that time. The interesting mechanism for handling the straw, chaff and grain was constructed according to Patent No.1937 granted to Jesse Morningstar of the village of Waterloo, January 19th 1866. In his patent application, Mr. Morningstar called his invention a "Self-regulating Grain Separator".

In 1880 Joesph Sharman with three brothers moved to the newly opened up Province of Manitoba where they settled their families on extensive acreage along the Souris River. A younger brother, James, was left behind to take charge of the Sharman Foundry in Stratford. Threshing machines continued to be the chief output under the new management. James Sharman advertized his "SURPRISE" separators in the Farmer's Advocate and other farm magazines and the accompanying illustrations show the "Surprise" machine as hand fed, mounted on four wheels and complete with tailings elevator and straw stacker. These separators were manufactured in three sizes - 28, 31 and 36 in cylinders to suit the requirements of individual farmers or threshers.

On a cold February morning in 1885, James Sharman was demonstrating a new device he had invented for his separators and intended to have patented when his heavy woollen glove got caught in the cylinder and before power could be shut off he lost his right hand and arm up to the elbow. This unfortunate accident was the beginning of the end of the Sharman Foundry and by 1888 the business folded up and the buildings and shops were either sold or dismantled.

STEVENS, TURNER & BURNS, LONDON.

Thomas Allin Stevens was born in Devonshire, England in 1845. He came to Canada in 1857 along with his father and mother who picked London, Canada West as their future home. As a young man he learned the plumbing trade and became an expert in the manufacture of brass articles.The manufacture of agricultural engines and threshing machinery was a growing industry in London with the consequent demand for brass valves, gauges, etc. A fellow mechanic, James Burns, persuaded him to go into this line as a business. With the financial assistance of W.P. Turner they formed the firm of Stevens, Turner and Burns and opened a factory on King Street in 1876, moving to the corner of Richmond and Bathurst Streets in London in 1881. They employed 100 men.

The first mention of this new firm in the Agricultural magazines of the period was in the October 1877 issue of the Farmer's Advocate where it stated that the firm of Stevens, Turner and Burns won first prize for the best Engineer's Brass Work Assortment at the Provincial Exhibition held in London that fall. Apparently the firm decided to go all the way in the thriving threshing machinery business as the following years found them advertising their "WESTERN EMPIRE" portable steam engines and their celebrated separators in the agricultural magazines. For several years they built the "CANADIAN THRESHER" patented by John McCloskey of Fingal, Ontario.

All Stevens, Turner & Burns portable engines were of the locomotive boiler type with the belt wheel on the right and cylinder mounted at the rear of the boiler. Although quite common in Western Ontario at one time the only one still in

existance is in the Western Development Museum in Saskatoon, Sask. where it is a prized exhibit.

W. P. Turner retired from the firm in 1886 and advertisements for the next few years were in the firm name of Stevens & Burns who continued on with the manufacture of portable steam engines and stationary saw mill engines and saw mill machinery. The date of the closing down of the business is not recorded but the name Stevens has been carried with the brass manufacturing industry in London for many years.

WATERLOO MANUFACTURING CO., WATERLOO.

The history of the thriving city of Waterloo, located in the rich agricultural county of the same name in the central part of South Western Ontario, dates back to 1806. In that year, Abraham Erb, one of a party of 48 who came from Franklin County, Pennsylvania, located on the land which is now the central part of the city. These early Pennsylvania Dutch settlers were well adapted to the rigorous conditions of pioneer life in this new country but being essentially agricultural these urban centres grew very slowly in the early days and it fell to the lot of the second generation to develop waterpowered mills and build manufacturing plants. One of these native sons, Jacob Bricker, was born in 1818 and learned the trade of waggon-maker and blacksmith in the neighboring village of Preston. Returning to Waterloo in 1850 he built a small shop and began the manufacture of pioneer tools and implements, gradually expanding his output to include threshing machines. In 1870 he purchased the Beuhler Foundry Co. which he operated as the Waterloo Foundry and confined his output almost exclusively to threshing machines, treadmills and horsepowers. His early threshers were of the canvas or apron type and his method of mounting them on two wheels made them quite popular.

In the late 1870's, John Beam, a mechanically minded thresher-farmer living near Baden, Ont., invented and patented a balanced sectional deck thresher operated by a double set of crank shafts. Jacob Bricker purchased the right to use this new separating device and in 1880 took his brother Levi into partnership and, under the name of Bricker and Company, began the manufacture of this promising new threshing machine which they named the "CHAMPION". These balanced deck machines proved to be a successful and popular thresher.

E.W.B. Snider, who had been born in the neighboring village of St. Jacobs and became a well-to-do miller, saw the possibilities of the fast growing threshing machine industry and, in 1888, purchased the plant operated by Bricker & Co. and the close by foundry where Samuel Merner had been making plows and other agricultural implements. Combining the two under the name of the Waterloo Manufacturing Company he immediately began the almost exclusive manufacture of threshing machinery. Jacob Bricker, now an elderly man, dropped out of the picture but Samuel Merner was retained as a foreman. The firm prospered and the trade name "LION BRAND" was chosen for their products and, as the years passed, Mr. Snider's sons assumed most of the executive offices in the company.

Jacob Bricker may have been experimenting with the manufacture of a steam engine to drive his threshers but Mr. Snider lost no time in placing his portable engines on the market. The first ones were of the return flue type with the flywheel on the left side and a long smokestack with a spark arrester of the water reservoir type near its base but public interest in the locomotive type of boiler soon caused a switch to this style. The open bottom firebox type was chosen and the popular diamond top smokestack adopted. Also, the engine was switched around on the boiler to place the flywheel on the right hand side. Around 1897, workmen experienced in building traction engines were secured as a result of the closing down of the Haggert Bros. foundry in Brampton, Ont. and the production of traction engines was commenced at Waterloo.

These early Waterloo traction engines were rated at 14 hp, were sidemounted with the boiler resting on springs and the countershaft mounted on a strong angle steel frame extending around the front of the firebox from one rear hind wheel bracket to the other. The engines were of the side crank type mounted with the cylinder at the smokebox end. A three shoe expanding friction clutch was used and early engines all had a two speed traction arrangement consisting of a slightly smaller intermediate gear bolted to the main gear and meshing with the larger of two pinions on the main shaft. To use the fast gear, a lever operated from the platform slid the smaller key driven pinion into a corresponding recess in the larger loose pinion. With care the device worked real well but disasterous results from attempts to change gears while the engine was in motion persuaded the firm to supply the two speed gear only when specially ordered.

Increasing demands for power kept the firm building stronger and heavier sidemounted engines up to the 10 x 10 in cylinder size but, apart from changing the clutch to a two shoe type, adopting a two piece cast smoke stack and adding a lion's head to the door of a rounded smokebox frame, little actual change was made in the original design. The call for a powerful engine that would stand up to the strain of plowing caused the firm to design a rearmounted engine in 1910. These heavy engines were built in the 27 and 30 hp sizes and had the same side crank engines mounted further back on the boiler. No springs were used in mounting the boiler and the gearing and road wheels were made much heavier. Except for a few experimental tandem compound engines made around 1903 only single cylinder engines were built and the double eccentric link reverse gear was used on all traction models. Two injectors were standard equipment but a Marsh feedpump was fitted to strawburner boilers if ordered. A patent exhaust nozzle was used on most Waterloo engines. With it, the choice of four different sized exhaust openings could be used by simply turning a handwheel on the outside of the smokebox.

With the advent of the gasoline tractor the firm attempted to enter the field and produced a gas tractor in 1911 which they rated at 22 hp. This tractor had rear drive wheels seven feet in diameter and a four cylinder slow speed vertical engine mounted lengthwise with the chasis and drove the beltwheel with a bevel gear. Although it worked fairly well the company gave up the idea of perfecting it and only a few were actually built.

Except for a few years in the late 1890's when a number of McCloskey patent "Counterbalance Threshers" were built the Waterloo Manufacturing Company continued to make the Bricker "Champion"

threshing machines and, although they were enlarged and improved, never saw fit to alter the design of the moving parts. These machines were built in two styles, the "Ontario Champion" for the East and the "Manitoba Champion", a heavier machine, for Western Canada. Champion separators are easily recognized by the high rear end and the double gear wheels on the side which controlled the balance of the decks.

Early in the century warehouses were established in Winnipeg and Regina to supply the Western trade. About 1908 the Winnipeg branch was closed and an extensive warehouse and assembly plant built at Portage la Prairie, Manitoba, to take care of the increasing Western demand. In 1925 the last new steam traction engine was built and three years later the Snider family, which had controlled the fortunes of the firm for forty years, sold out their interest to the H.V. McKay Company of Australia who chose Waterloo, Ontario, as the place to manufacture and distribute their self-propelled combines on this continent. The new owners continued to operate as The Waterloo Manufacturing Co. Limited but the depression years forced them to abandon the manufacture of combines. Some construction machinery and various agricultural implements including garden and orchard power cultivators were produced. Grain separators in the smaller sizes were made in the smaller sizes until the 1940's but the firm then acted as Canadian distributors for the U.S. built "Belle City" threshers and Minneapolis-Moline farm tractors.

WATEROUS ENGINE WORKS CO., BRANTFORD.

Back in the early 1830's Philip C. Van Brocklin, who had learned the trade of moulder in the New England States, came to Canada to work in the iron foundry at Normandale, Ont. Here he met in with another New Englander by the name of Leonard and the two decided to pool their small resources and start at foundry in St. Thomas. The venture was not a success so the partners separated to try new fields. Mr. Leonard went a few miles north to London while Van Brocklin moved on fifty miles east to the hamlet of Brantford, Ontario, where, in 1844, he built a small foundry and machine shop and began the manufacture of pioneer agricultural implements and stoves. In 1849 Charles H. Waterous entered the firm and under his careful management the business began to grow, slowly but steadily. Steam power replaced the small tread horse power, the buildings were enlarged and new lines of machinery were manufactured.

The country immediately surrounding the then village of Brantford was covered with a vast pine forest. The Company met the demand for saw mills by producing the old "Muley" up and down water powered mill, improving it by adapting it to steam power. A few years later the first circular saw mill built in Canada was turned out by the Waterous firm. This mill had the saw direct connected to the engine shaft. The engine had no governor and was allowed to run as fast as the steam would drive it. Hundreds of these "Clipper Mills" were built in the 1860's and became important factors in the settlement of the country. By degrees this class of mill was replaced by high speed belt driven saws and about 1888 the first band saw mill was designed and built by the company. Sawmills have continued to be an important product of the firm which became known in 1860 as the C.H. Waterous and Company and in 1874 was incorporated as The Waterous Engine Works Co. Limited.

In 1877, Mr. David June developed and patented the Champion engine and, being connected with the family, gave the patent rights for Canada to the Waterous Co. Nine were built the first year, 85 in 1878, 185 in 1879, 210 in 1880 and so on until over 1800 upright Champions were sold. These engines had an upright boiler with a centre crank engine mounted on a V-shaped casting extending horizontally in front and supported by the front axle. On top of the cylinder a round steam chest was mounted crosswise and the circular valve was operated by a rocket arm. A Pickering governor was used and the boiler was fed by a crosshead driven pump forcing the feed water through an exhaust heater. The danger of fire was met with "June's" Patent Spark Arrester mounted on top of the boiler. By means of an inverted cone the exhaust was deflected downwards driving any sparks or coals into the reservoir which was automatically filled with water by the feed pump. The first stressed this important fact by calling their engine "THE FIRE PROOF CHAMPION". To meet the demands of the Western market the upright boiler was equipped with a special furnace hung on the back in which the straw was burned leaving only the hot gasses to enter the flues. To help the draft the patent spark arrester was left off the straw burners.

The Waterous firm pioneered in the traction field in Canada, coming out with their first traction in 1881. Chain driven and horse steered it worked despite its crudeness and was the subject of much public interest. Each year improvements were made in the reversing mechanism until the double eccentric link motion was adopted. A two shoe friction clutch connection with the flywheel was added in 1886 making the Champion traction efficient and easily handled. The chain drive was never dropped and the company always referred to it as the link-belt drive. Early portables were built in the 6, 8 and 10 hp sizes but the 12 hp soon became the standard while the tractors were usually built in the 16 and 18 hp sizes. Late models had the upright boiler made in three styles, plain, sectional and horizontal tubes entirely covered with water or sectional with upright tubes and a small dome hidden in the lower part of the smoke stack. Owners claim it was quite possible to raise steam to threshing pressure from cold water in twenty minutes with these boilers.

In the late 1880's there was much controversy over the relative merits of the upright and horizontal types of farm engines. The Waterous Co. staunchly upheld the upright boiler but finally in 1890, at the repeated request of customers, mounted the Champion engine on a horizontal return tubular boiler with water back and large combustion chamber. At the same time the engine was improved by dropping the steam chest below the cylinder to allow natural drainage through the valve ports. These Clyde style boilers took long firewood, a decided advantage from the viewpoint of the farmers who had to do the cutting. The spark arrester was the same as used on the upright Champion but lighter and improved to allow direct draft while getting up steam.

A few years later the firm changed their belt wheel over from the left to the right hand side

and mounted the Champion engine on a return tubular fire-box boiler. This odd boiler, which the Waterous Co. called the "New Economic Boiler" had a round top conical shaped water bottom firebox added to the regular return flue portion. The combustion chamber extended in front and was riveted to the shell and lined with firebrick. A long low dome was used with the 8 and 10 hp while the 12 and 17 hp had an upright dome mounted well forward. In 1896 the Waterous Co. began building this type of boiler into a traction engine in the 18 hp size with 8 3/4in x 10in cylinder using the same gearing and controls as the Buffalo-Pitts. The engine was of the centre crank, slide valve type with valve chest and double eccentric link motion reverse gear on the outside for easy access. Heavier tractions in this same style were built for the West.

In an attempt to keep "abreast of the times" the company made many changes in the next few years. Slide valves replaced the old rotary type on all engines and boilers were built in regular locomotive style with open bottoms. At the turn of the century the firm began to experiment with double cylinder engines and by 1904 these had become their standard with the exception of a few single cylinder portables and a 17 hp traction which they called their "Ontario Standard". All these locomotive type engines had the flywheel forward and the cylinder or cylinders mounted over the firebox. The double eccentric link reverse gear was first used on the double cylinder engines but was soon changed to the Woolf single eccentric type. The centre cranks were counterbalanced and the cylinders were mounted close together withthe steam chests and valve gear on the outside. A drypipe in the boiler replaced the steam dome on all double cylinder engines. These were built in three sizes, 18, 22 and 26 hp the latter had two 7 in x 12 in cylinders and was built in two styles, one with heavier road wheels and gearing for ploughing and heavy hauling. To meet the demand for a powerful ploughing engine, a rear-mounted type was designed and built in 1906. The same style, but heavier boiler was used and a more powerful double cylinder engine was reversed with its mounting to bring the crank shaft closer to the new position of the counter-shaft behind the boiler. An extra flywheel was placed on the left side and the clutch and all gearing moved over to the left side also.

Despite the many changes over the years the Waterous Co. stuck with the Pickering governor and it is noticeable that all boilers of the locomotive type had the front axle braced straight to the firebox instead of diagonally up to the boiler.

When the gasoline tractor came on the market, the firm dropped the steam and never entered the gasoline field. The last new steam traction engine was built in 1911 but steam road rollers were built for some years after. No separators were built.

Chas. H. Waterous, widely known for his executive and mechanical ability, was a native of Burlington, Vt. and died in Brantford, Ont. in 1892 at the age of 78. The firm "Waterous Limited" still build all sizes and types of boilers and a long list of pulp. paper, sawmill and mining machinery. They dropped out of the threshing engine business sooner than many firms but have the satisfaction of knowing that their pioneer efforts aimed at producing a farm engine embodying safety from fire and explosion and combining lightness with strength had much to do with making steam threshing popular in Canada.

JOHN WATSON FOUNDRY, AYR.

John Watson was born in Glasgow, Scotland, in 1820. As a young man he served a seven year apprenticeship in the moulding trade and worked as a journeyman in Scotland, England and Ireland acquiring a thorough knowledge of the trade. In 1842 he decided to seek larger advantages on this side of the Atlantic. Landing in New York he worked his way on foot to Buffalo then to Hamilton, Ontario. The year 1845 found his in Galt where a study of the opportunities in the rapidly developing market for farm machinery persuaded him to embark in business for himself. He chose the village of Ayr, only a few miles away, to establish his small shop in 1847 which flourished and grew with the years until he was producing almost a full line of haying and harvesting machinery including his self-tying binder.

To round out his line he added horse powers and a threshing machine in the 1850's. His separator was of the endless apron type patterned after Hiram A. Pitt's patent of 1838 in which a wide canvas belt with attached wooden slats carried the straw and grain away from behind the cylinder. Twenty years later he began building one of the first of the new type separators in Ontario in which the grain was separated from the straw by means of shaking decks and moving fingers that tossed the straw on its way to the rear of the machine. John Watson called his new separator the "AGITATOR" and it became quite popular with threshermen and farmers.

John Watson died in 1903. William D. Watson returned to Ayr upon the completion of his college education in order to engage in the business with his father and at the time of his death on April 15th 1907 was Secretary-Treasurer of the Watson Manufacturing Company.

John Watson's daughter, Miss M.U.Watson, was first principal of the Macdonald Institute at Guelph.

GEORGE WHITE & SONS CO., LONDON.

George White was born in Devonshire, England. As a young man he learned the blacksmith trade in his father's waggon-building shop and, had he not decided to visit Canada on his wedding trip, a name prominent in the annals of Canadian industry might be missing.

Arriving at London, Ontario, in 1857, George White was delighted with the young country and despite the depression following the end of the Crimean War decided to stay and open up a blacksmith and general repair shop in the fast growing city. However, returning farm prosperity soon enticed him with the prospect of owning a hundred acres of land and the next few years found him farming a few miles north of London. White's knowledge of ironworking became well known and his services were so much in demand that he decided to move back to the city and reopen a shop. Business was good and his small shop grew steadily and soon became known as the Forest City Machine Works.

During his farming days George White became conscious of the great need for a suitable agricultural steam engine and immediately he had the shop and tools he began to work on plans for the manufacture of such an engine. Several small steam engines were designed and built and when he was satisfied with his engine he set about acquiring the necessary boilermaking machinery. Finally, sometime in the early 70's, his first portable farm engine was completed, to be followed by many hundreds more known from Coast to Coast in Canada as "White's Threshing Engine". These portable engines were all of the return flue type and, to conform with early separators, had the belt wheel on the left hand side. The first engines had a very long smoke stack with a dome shaped screen on top and hinged for lowering when moving. Later, a shorter solid smoke stack was adopted. This stack, usually called the diamond top, had an expanded hinged hood to which an inverted conical screen was attached and became popular with various manufacturers in Ontario for many years.

During the late 70's and early 80's, George White made several pioneer trips to the Canadian West and established his machines in that fast developing area. The first engines had to be shipped via U.S. railroads and hauled the long distance North by horses or oxen. After the Canadian Pacific Railway crossed the prairie, a large warehouse was built at Brandon, Manitoba, to serve Western Canada.

In the mid 90's, self propelled engines were becoming popular and to meet this demand the White factory built a number of traction engines of the return flue type using the United States "Huber" as a pattern. Although proud of his early engines, George White was an observant man and, noting the interest being taken in several makes of locomotive type threshing engines, decided to build a new White engine. He chose the open bottom locomotive type boiler with small dome and drypipe, mounted the engine with cylinder at the smokebox end which switched the belt wheel over to the right side. His traction engines, built in the 17, 20 and 22 hp sizes, were sidemounted with springs in the brackets and fitted with Stephenson Link reverse gear, Gould slide valve and a three shoe expanding flywheel friction clutch. For the Western trade a 25 hp Special was built. This engine had a 9½in x 11in cylinder and was fitted with straw-burning arch and grates. The demand for an engine that would stand up to the heavy demands of ploughing compelled the building of a rear-mounted type in 1912. No changes were made in the general design, the engine was simply moved back to fit the new location of the counter shaft and heavier gearing and rear wheels were used. These rearmounted engines were built in the 25 and 30 hp sizes. Later a smaller rear-mount engine with 9in x 10in cylinder was built for the East.

"White" engines were all simple and were built plain and sturdy with no fancy fittings. Two injectors were standard equipment and a relief valve for draft control was fitted on the exhaust pipe. Most Eastern type engines had a novel two-speed gear consisting of a short counter-shaft holding two small gears and mounted directly above the intermediate gear. A lever operated from the platform moved the pinion on the main shaft in contact with either the intermediate gear or the largest of the small gears on the countershaft. For the slow speed the engine was run in the opposite direction. When the operating lever was in the halfway position the gearing was effectively locked doing away with the necessity of blocking the wheels when tightening the belt.

Previous to 1898 only engines were built. That year the firm absorbed the plant of the MacPherson Co. of Fingal, Ont. who had been building the "Challenge" separator. This machine, already highly developed and well known, rounded out the White output advertized as "The First Quality Line". Self feeders and rear-cutting attachments were later added and the "Challenge" was built in all sizes to suit the Eastern and Western trade.

When the demand came for gas tractors, the firm became Canadian agents for the ALL WORK kerosene tractors. Later the JOHN DEERE tractors were handled for many years and more recently the B. F. AVERY agency was secured.

George White had nine sons and three daughters. After finishing school, seven of the boys started to work in their father's factory. Upon completing his apprenticeship, each son was absorbed into an executive position in the firm which became known in 1880 as The George White and Sons Company.

The last new engine was built in 1924 but engines were repaired and rebuilt for many years after. However, unlike many early threshing machinery manufacturers, The George White and Sons Company Limited is still going strong, building a variety of farm power machinery. A few of the larger separators were still built in 1950 but most of their threshing machines were made in the 24 and 28 in cylinder size for use by individual farmers and small tractor owners. The "White" separator was little changed from the old "Challenge" but wood had given way to all steel construction. All bearings are ball or roller and the operator carried a greasegun instead of the old familiar oilcan.

R. WHITELAW FOUNDRY, WOODSTOCK.

Robert Whitelaw was born in Roxboroughshire, Scotland, in 1827. He emigrated to Canada and established a foundry at Beachville in 1856. The foundry was moved to Woodstock in 1874 with the aid of an $8,000 loan from the town. It became the Oxford Machine and Foundry Co. The loan stated that the company would produce among other agricultural things, separators and steam engines.

In the 1880's the Farmer's Advocate and other farm magazines carried many interesting and eye catching advertisements for new agricultural machinery. One of these was the advertisement submitted by R. Whitelaw for the Oxford Foundry and Engine Works, Woodstock, Ontario, and pictured one of his "CLIMAX" portable steam engines pulled by a prancing team of horses which looked more like a fire engine headed for a fire.

The Climax portable engine had an upright boiler with the engine mounted in front on a frame extending to and resting on the front axle. To the farmers of those days one of its chief claims for approval was that it was perfectly fire proof and no water was required in its spark arrester. Many barn fires had been caused by the carelessness of operators in not keeping the water in the spark arresters in common use on early farm engines up to the required level. For those who preferred a horizontal type the Oxford Foundry also built a return flue portable engine with the engine mounted on top of the boiler. Mr. Whitelaw called this engine the "Economizer" and stressed the fact that it too had a perfect spark arrester. To conform with the early makes of separators then in use both the Climax and Economizer farm engines were constructed with the belt wheel on the left side of the engine.

No attempt appears to have been made to enter the traction engine field but the Oxford Foundry continued to build steam engines for many years. Some were of the larger size required by factories but the majority of their engines were built for cheese factories, creameries, bakeries and other small manufacturers.

Amongst the wonderful collection of old steam engines on exhibit at the Western Development Museum in Saskatoon, Sask., is a return flue portable engine bearing a nameplate which reads "Engine #159, Mfg. by R. Whitelaw, Woodstock, Ontario."

THE STRAW PROBLEM

Back in the pioneer days in Ontario the threshing of the harvested and stored grain was done during the winter months with hand flails or a tread power driven thresher consisting of a cylinder and stationary grate with teeth and some simple device to shake the grain from the long straw. The resulting straw created no problem as it was used for bedding or feed about as fast as it accumulated. With the advent of the larger travelling threshers the whole seasons crop was usually threshed at one set of the machine and the volume of straw resulting did become a problem.

It was customary to store as much as was possible in the barn and the remainder was built into a round or square stack in the barnyard. It required at least three men to build a straw stack and if properly tramped and shaped would shed rain like a shingled roof. From this outside stack quantities of straw were hauled into the barn as required and used long or cut short with a cutting box operated by hand or driven by a tread power.

In order to retain the weather resistance of a straw stack it was customary to cut loose a section from the top to the bottom. This was accomplished by the use of a straw or hay knife which had a 24 inch blade with coarse gouges to give it more bite and a double handle so that pressure could be directed both downwards and sideways. Down on one's knees on a cold winter day with chunks of snow falling on the back of your neck as you laboriously made a cut across a straw stack was far from fun. The straw knife and buck saw were two tools that undoubtedly must have influenced many a boy to decide to leave the farm.

Cut straw took up much less storage space so custom threshermen at the turn of the century began cutting the sheaves with a cutting box placed in front of their separators and conveying the cut straw and grain right into the cylinder of the threshing machine by means of a short conveyor. This was considerably slower than straight threshing but was favoured by many farmers. It became quite popular.

John Richmond, a mechanically minded farmer, living near Blyth, Ontario, undertook to improve on this rather awkward set-up by combining the straw cutter and separator into one machine. He built a cutting cylinder and ledger plate immediately in front of the threshing cylinder on a regular separator. This machine worked quite well but, having no long straw for the straw decks to handle, the grain shoe became overloaded unless the sheaves were fed into the cutter rather slowly. Realizing the problem, John Richmond with the help of his son Martin, set to work to design and build a new separator in which the straw decks were replaced by second grain deck and an extra cleaning fan. Both of the new decks were given a circular shaking motion that thoroughly shook the grain from the cut straw as it was moved to the back of the separator and dropped into the straw blower. John Richmond named his new machine "The Universal Separator" and after a thorouth trial had his invention patented. In 1905, the patent rights were purchased by the Sawyer & Massey Company of Hamilton, Ontario, but only five of these new type machines were built.

While John Richmond was busy perfecting his separator a group of farmers living on the Thames Road, east of Exeter, Ontario were working out a somewhat similar solution to the problem and persuaded the firm of George White and Sons, London, Ontario to build a separator with a front cutting attachment according to their ideas. This separator also worked reasonably well but the George White firm did not continue their manufacture.

While these experimental machines were being developed three men, two brothers and a cousin by the name of Stewart, living near the village

Molesworth, Ontario, tackled the straw problem in a slightly different way. They used a standard separator and built the cutting knives and ledger plate across the back of the machine so that the long straw leaving the straw deck was fed through an upper and lower set of rollers directly into the cylindrical knives and the resulting cut straw fell directly into the blower. When cut straw was not required the lower set of rollers were dropped and the straw passed under the cutter knives and into the blower without touching them. To sharpen the cutter knives a full length circular emery stone was mounted on a revolving shaft immediately behind with screw adjustments allowing the desired pressure between stone and knives. After the knives were sharpened the emery stone was backed off and the belt removed until next needed. A patent was granted to David A., John F., and Robert C. Stewart, co-inventors, in April 1904 and the "Stewart" straw cutting attachment rights were soon taken up by most threshing machine manufacturers in Ontario.

Meanwhile, Emery Peckam, an old thresher in the Norwich, Ontario, area was tackling the cut straw problem in another way. He used the cylindrical cutting knives in front of the threshing cylinder but replaced the usual straw and grain decks with an entirely new separating device patterned after the familiar gravel screening plants. In his machine the straw and grain from the cylinder went directly into a large rotating cylinder the length and width of the separator. Constructed of screen it allowed all the grin to drop through to the cleaning shoe while the cut straw was rolled to the rear. Only three of these Peckam separators were built. Frank Fidlan of Norwich used one of them for over twenty years.

With the years the threshing picture began to change. Farmers began to use gas tractors for most work and with their own power supply wanted a smaller threshing machine in order that they could do their own threshing at their own convenience. These smaller machines were too lightly built to support the weight of the heavy cutters in common use so the straw problem came to the fore again and once more the inventors came to the rescue. This time with shredding devices that broke up instead of cut the straw. They required less power to drive and needed less attention. The resulting straw was softer for food and more absorbent for bedding.

The Herrgott Thresher Co. of St. Clements, Ontario, built an excellent shredder in several lengths that could be attached to any make of threshing machine. The Ebersol Farm Equipment of Milverton, Ontario, built the "Wonder" straw shredder which could also be fitted to any make of thresher. Lobsinger Bros., Mildmay, Ontario, patented a combined blower and shredder which they built into their "Lion" separators. The teeth and cutters that shredded the straw were built into the blower fans and attached to the inside casing of the straw blower and could be adjusted by a hand lever while the machine was in operation. Lobsinger Bros. were one of the last firms building threshing machines in Ontario.

One cannot but wonder if any of these dedicated inventors ever envisioned the day when a smaller version of the immense combined reaper and threshing machine that were designed to handle the harvests of the vast wheat fields of Australia and California would so completely take over in Ontario and render their beloved threshing machines almost obsolete and leave "The Straw Problem" still not completely solved.

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There are several other Ontario companies who have manufactured, or sold under license, threshing machines or agricultural steam engines but for whom little information is available.

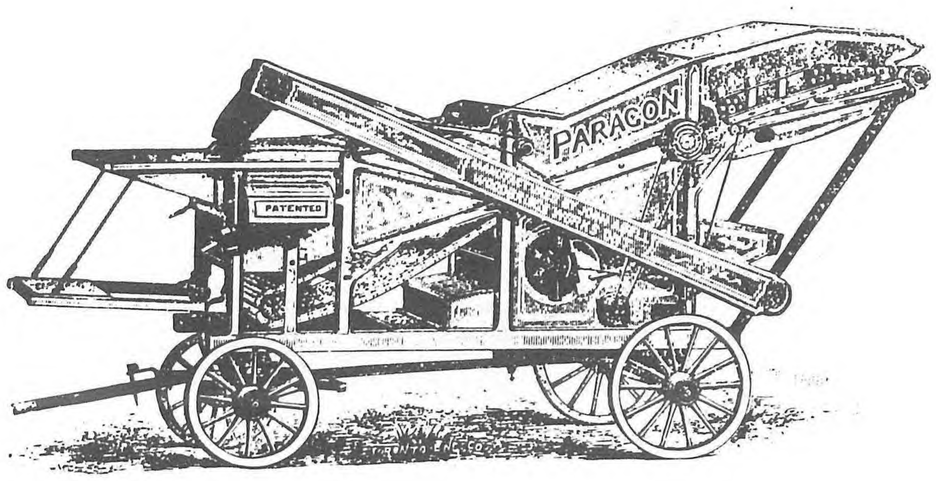
Patterson & Bros., Agricultural Implement Works, Patterson (near Richmond Hill) was established in 1850 and produced a full range of agricultural equipment - mowers, reapers, combination mower, wrought beam plow, horse rake and spring tooth harrow. The company produced a separator after 1880 and sold the Abell engine.

Ferguson Thresher Co., Maxville was managed by James Ferguson who invented a separator for a threshing mill in 1881. The company produced a hand-fed threshing machine driven by a horse treadle as early as 1870.

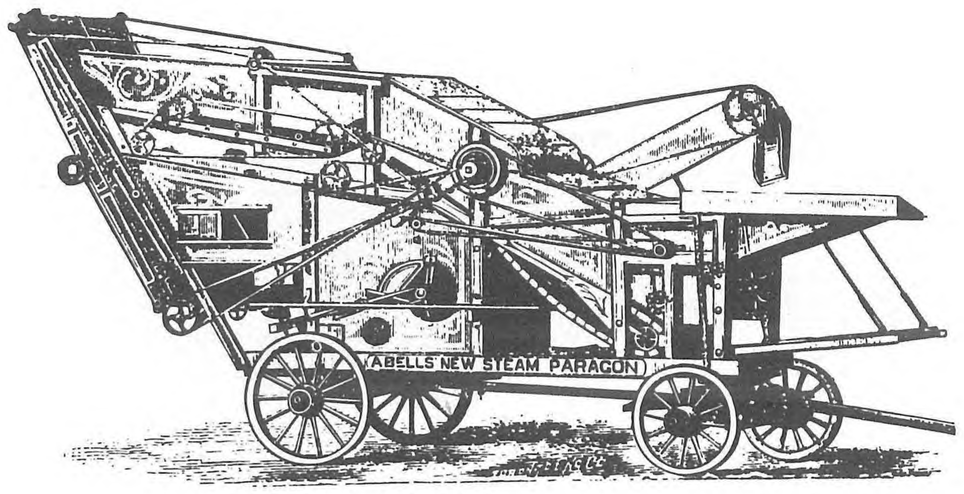
Lobsinger Bros., Mildmay produced the wooden framed "Lion" separator to the 1960's.

Neustadt Agricultural Works operated by Benkle Bros.

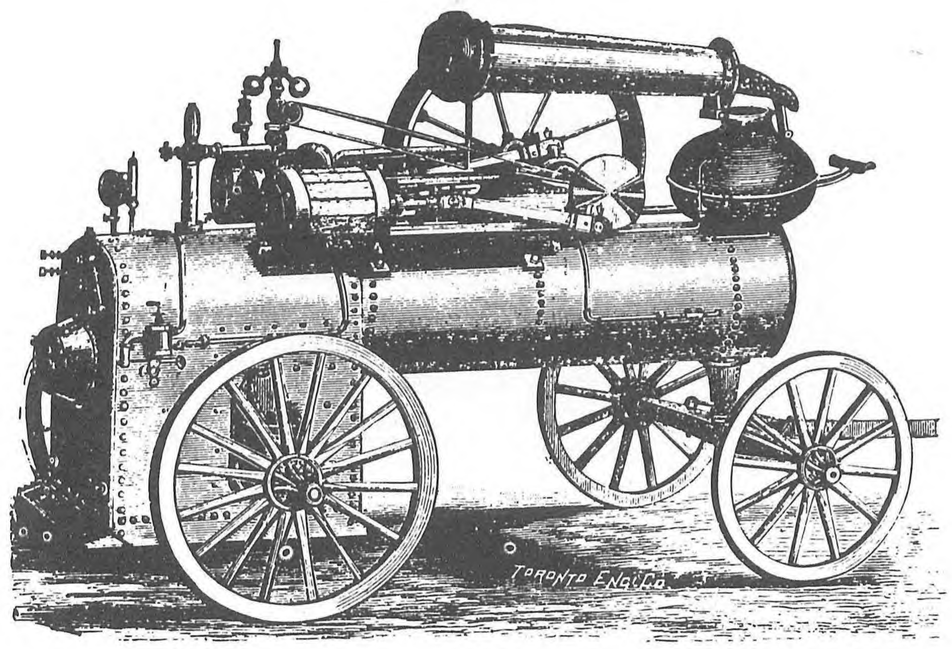
G.M. Cossitt & Bros., Brockville	1876
Ingleton & Co., Brantford, "Conqueror" separator	1888
Frost & Wood, Smith's Falls - thresher	1872
Watts Foundry, Ridgetown	1910
Eastwood & Co., Ingersoll	1876
Walker Foundry, Belleville	1860



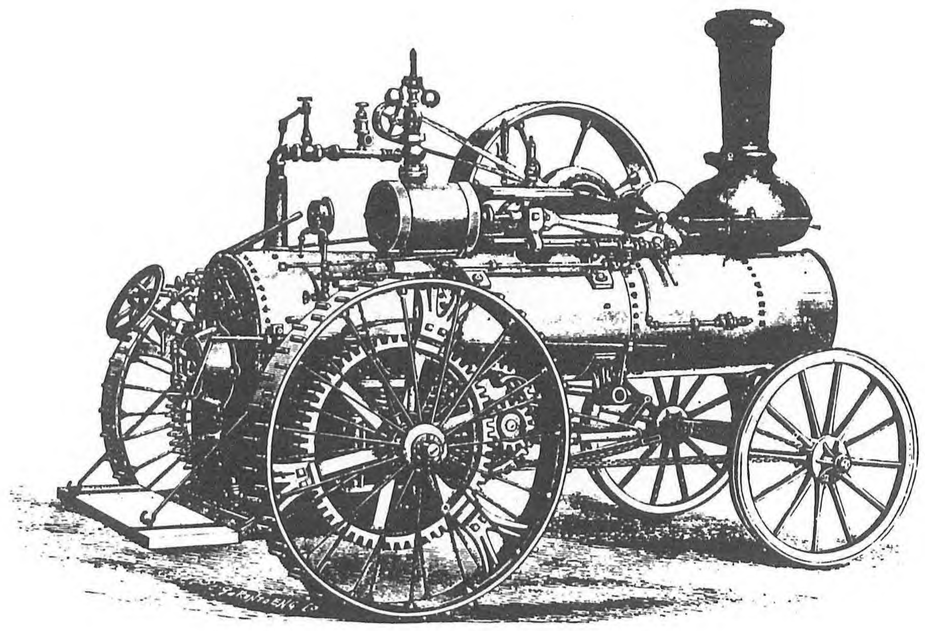
John Abell 'Paragon' Separator
with
Horsepower Drive



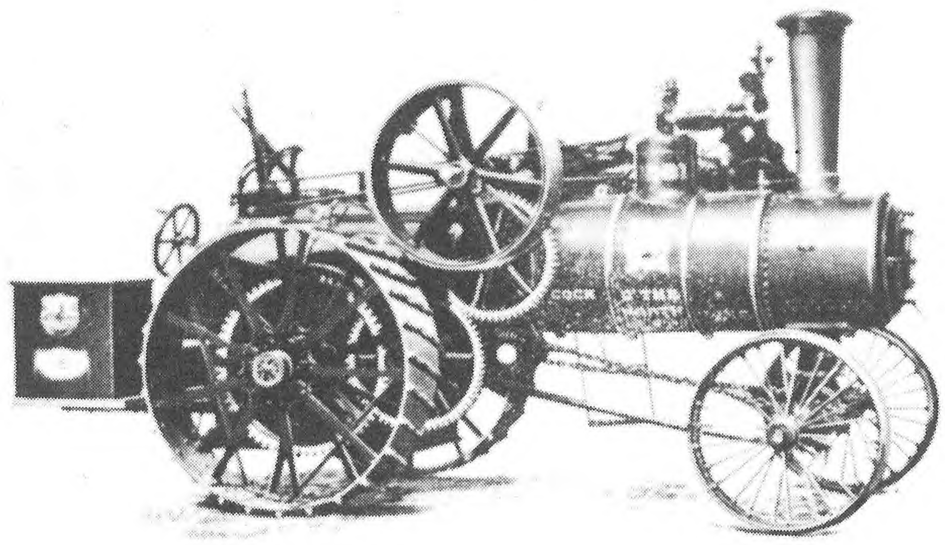
John Abell 'Paragon' Separator 1880



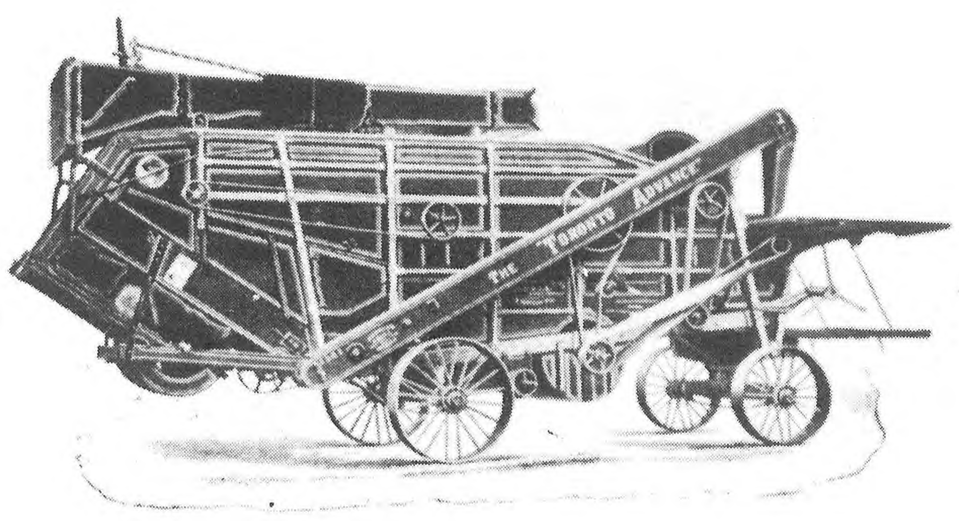
John Abell Cross Compound Portable 1880



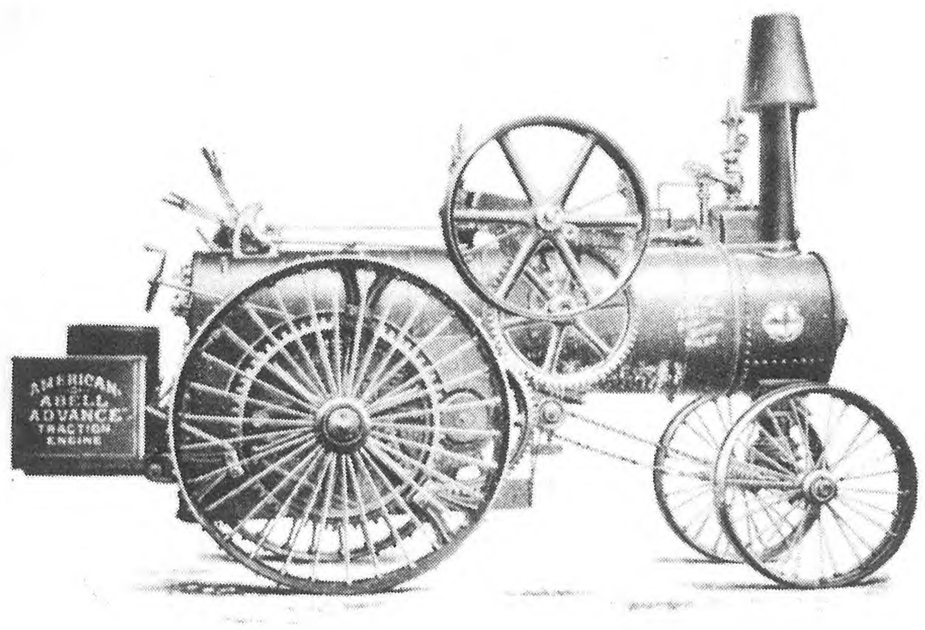
John Abell 'Triumph' Traction 1886



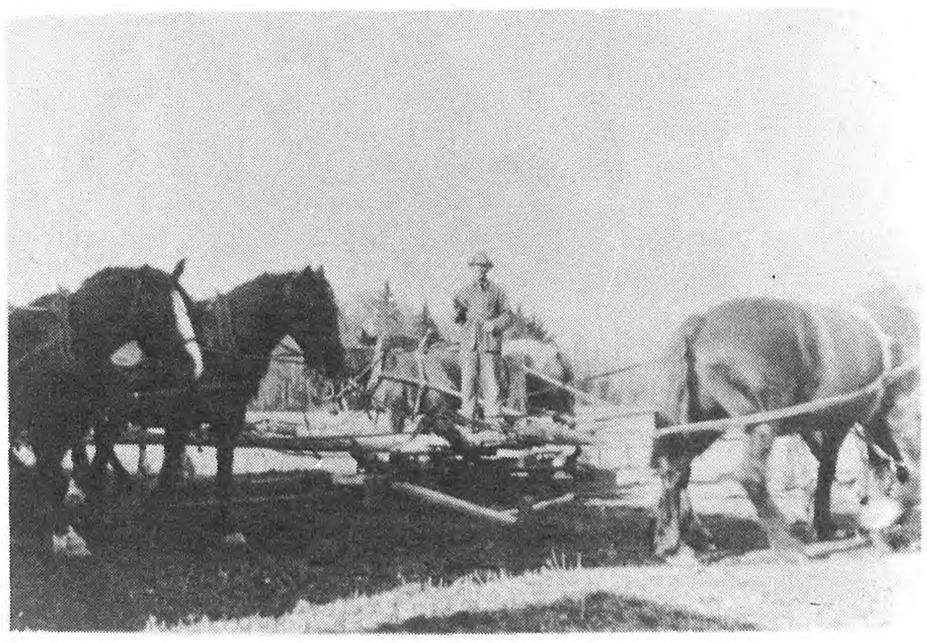
American-Abell 'Cock O' the North' Traction



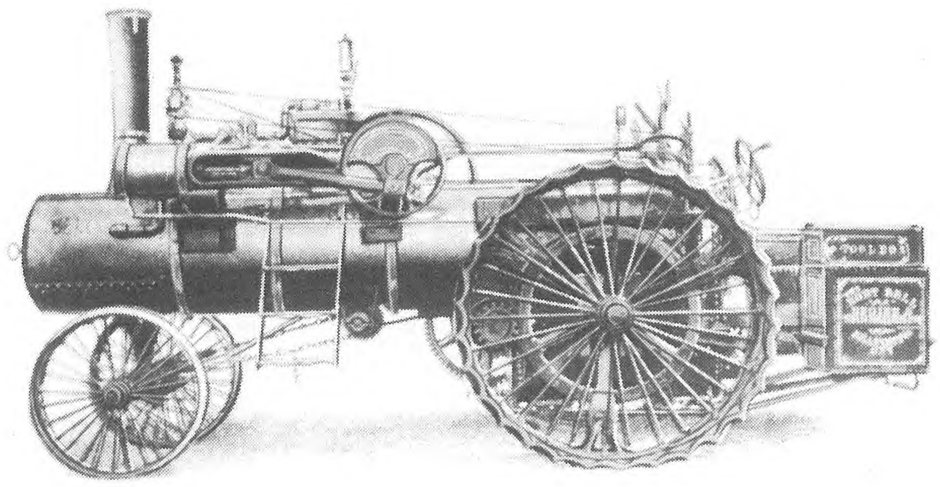
American-Abell 'Toronto Advance' Separator



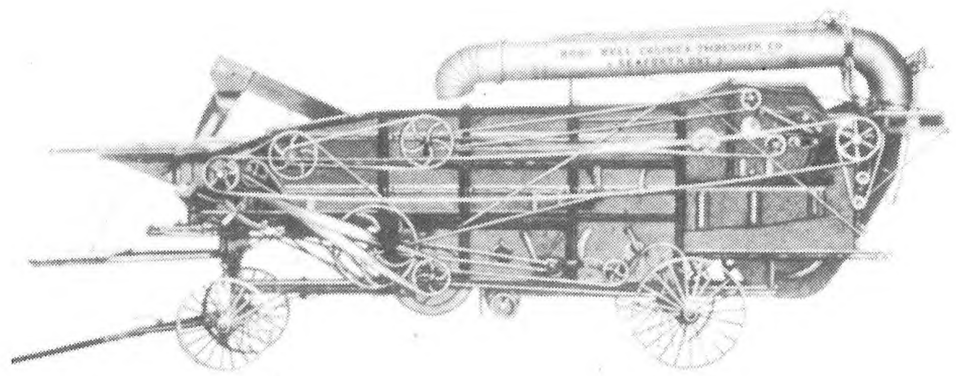
American-Abell 'Advance' Traction



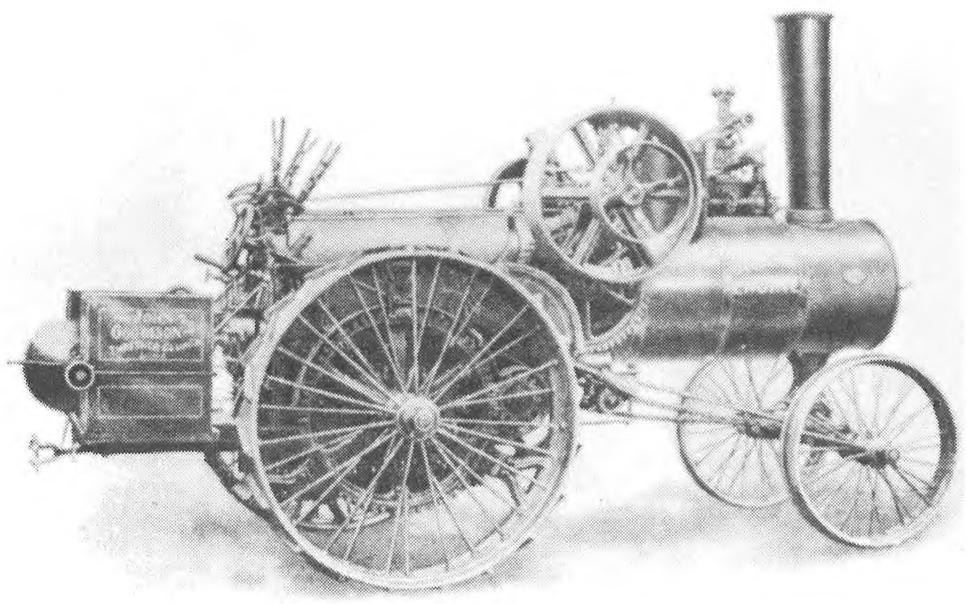
Horsepower, Pakenham



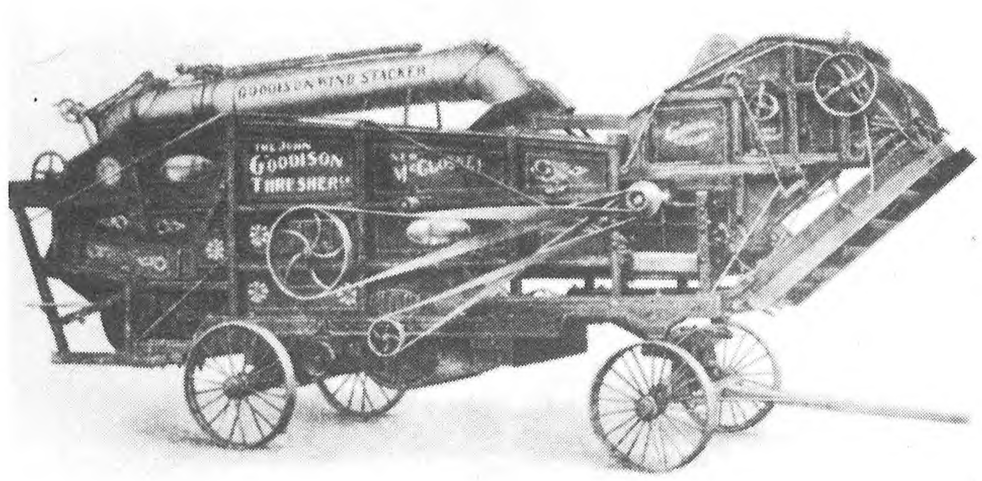
Robt Bell Traction 22 hp



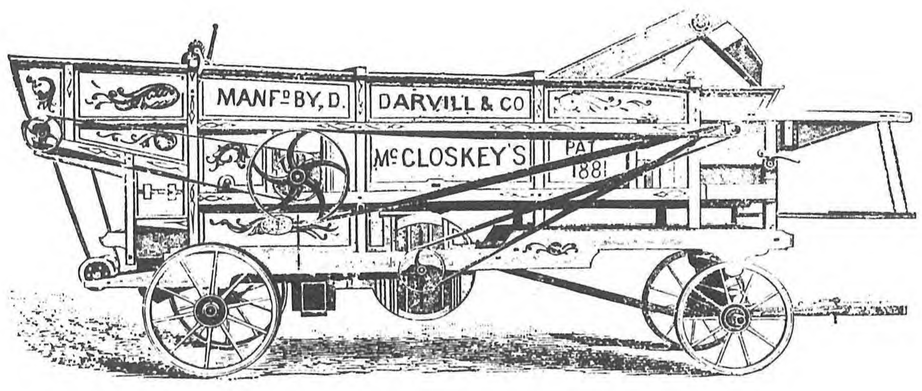
Robt Bell 'Imperial' Separator



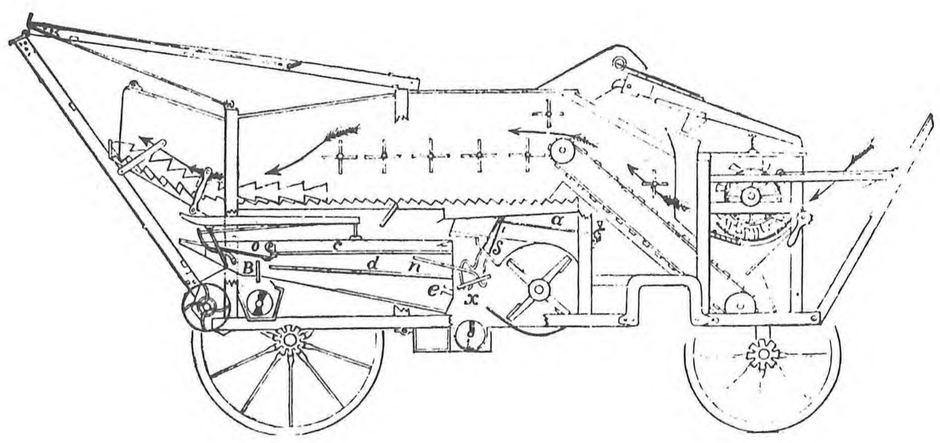
Goodison Traction 18 hp



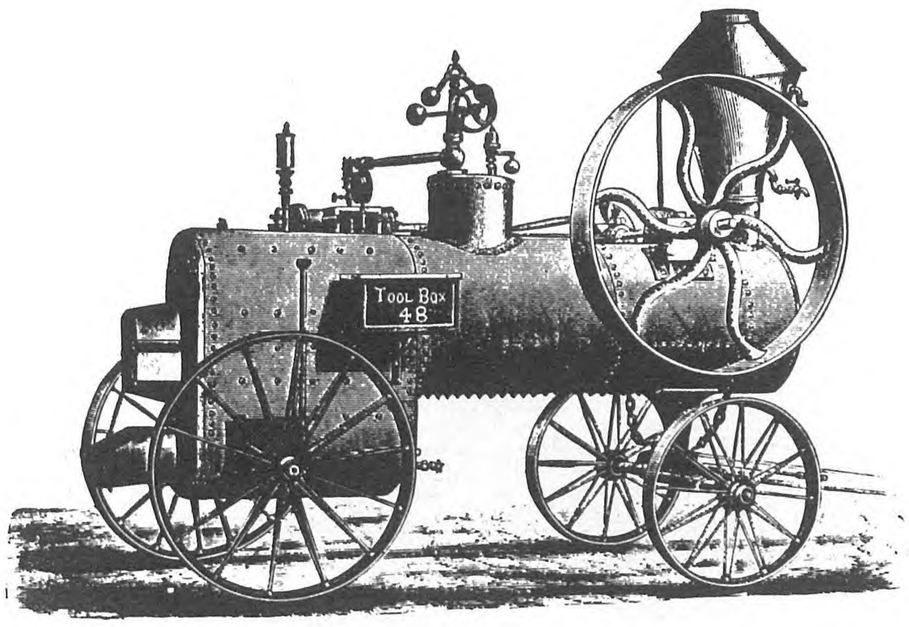
Goodison 'New McCloskey' Separator



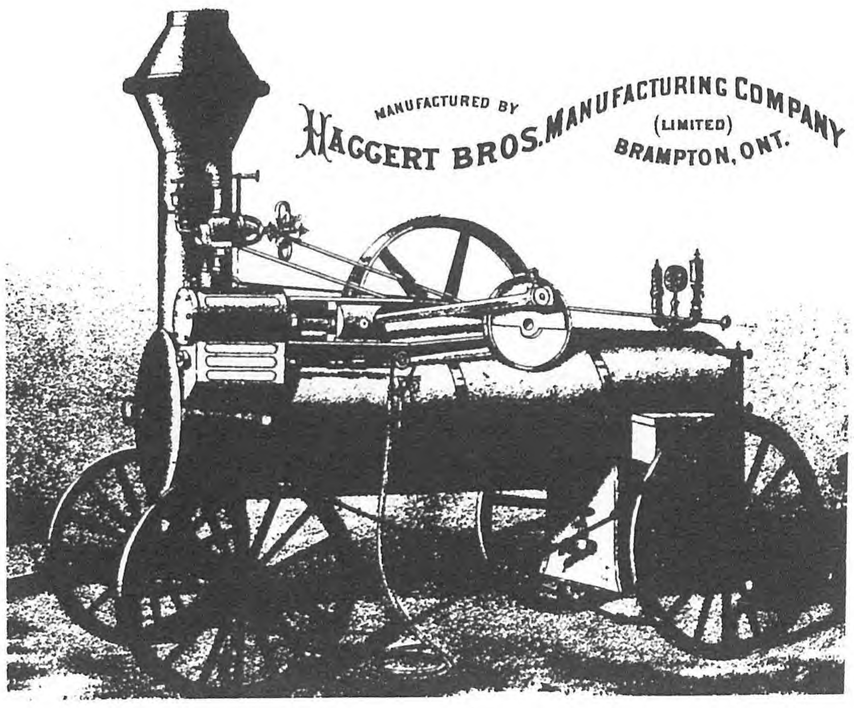
McCloskey's Separator 1885

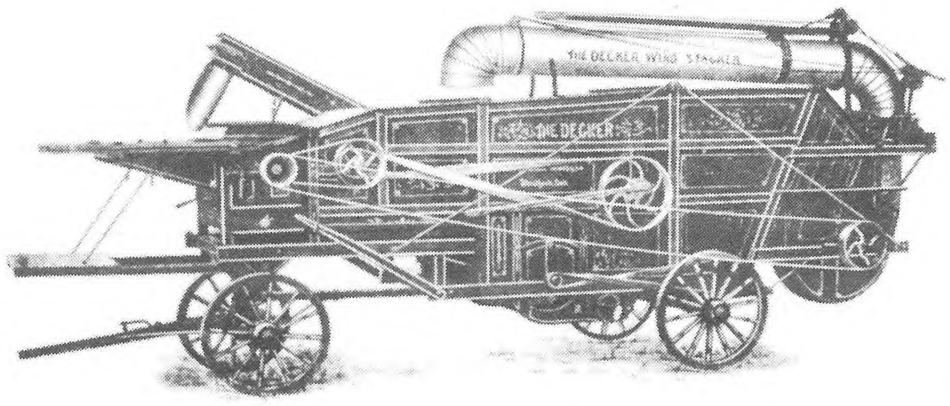


Joseph Hall 'New Model' Vibrating Separator 1884

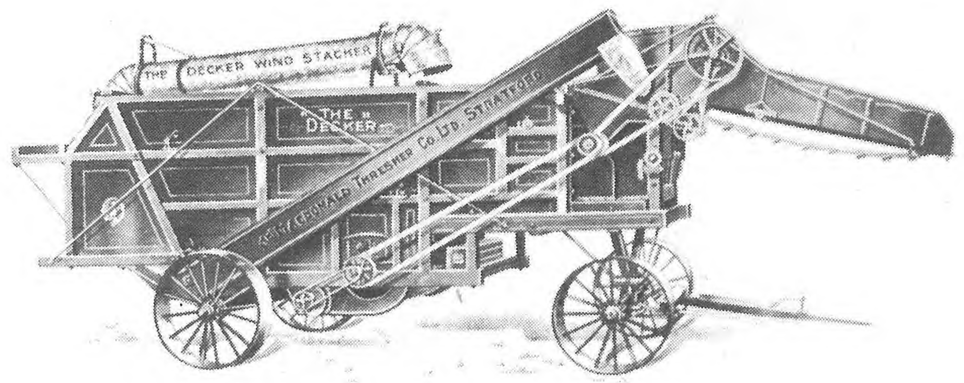


Joseph Hall 'Oshawa' Portable 1880



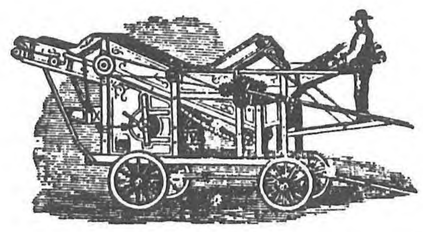


Macdonald 'Decker' Separator



Macdonald 'Decker' Separator

IMPORTANT IMPROVEMENTS for 1877.



THE UNRIVALLED

GRAIN SAVING & LIGHT RUNNING

"CLIMAX"

Threshing Machines,

"Vibrator" Threshing Machines,

With Pitt's improved horse powers, either "down" or "mounted."

Substantial, Durable, Handsome.

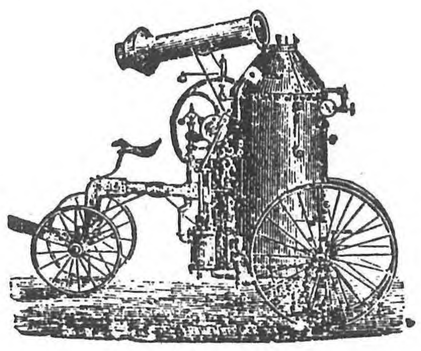
THE LEADING THRESHING MACHINES OF THE DOMINION.

——:o:——

"Monitor"

AGRICULTURAL

STEAM ENGINES,



The best Portable Engines in use. Require one half the Water, one half the Fuel, and are only two-thirds the Weight of others of equal power.

Every Machine fully Warranted.

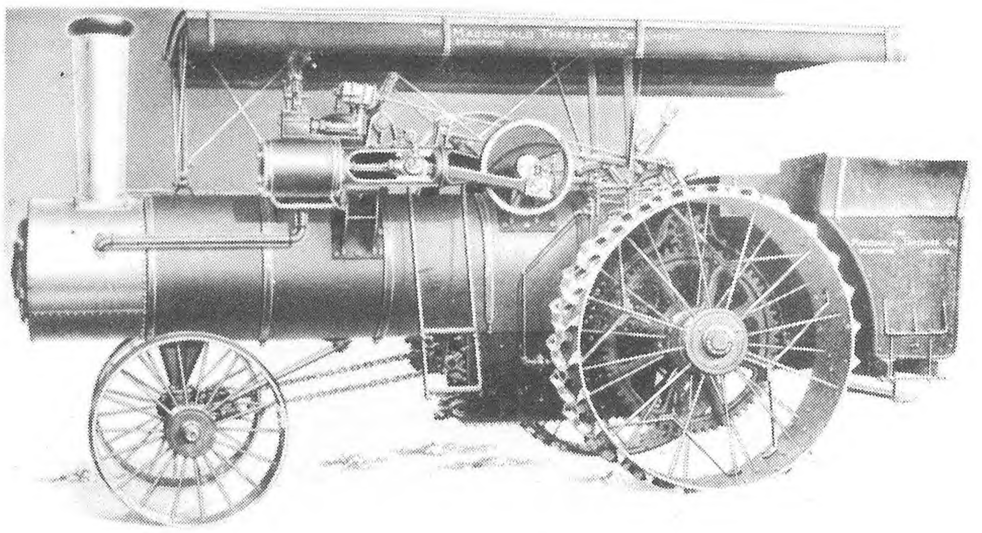
MANUFACTURED BY

McPherson, Glasgow & Co,

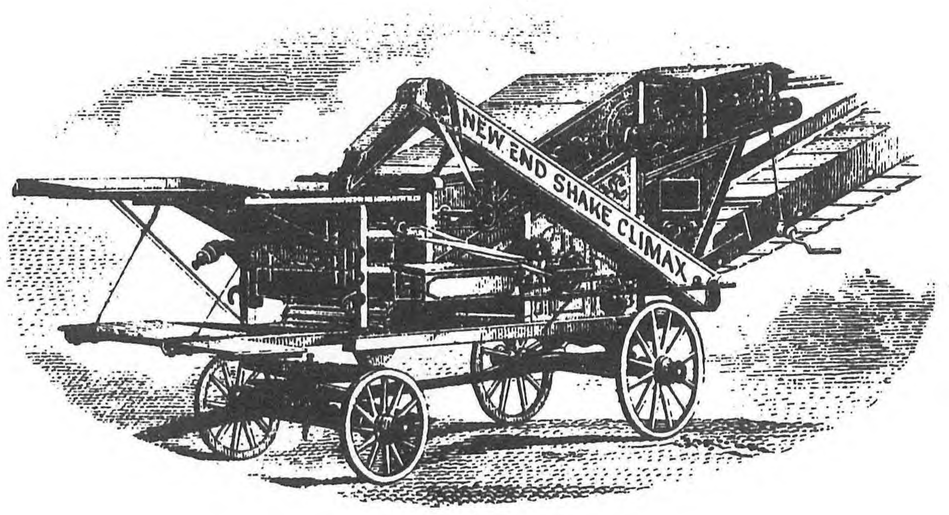
FINGAL, ONT.

Glasgow, McPherson & Co,

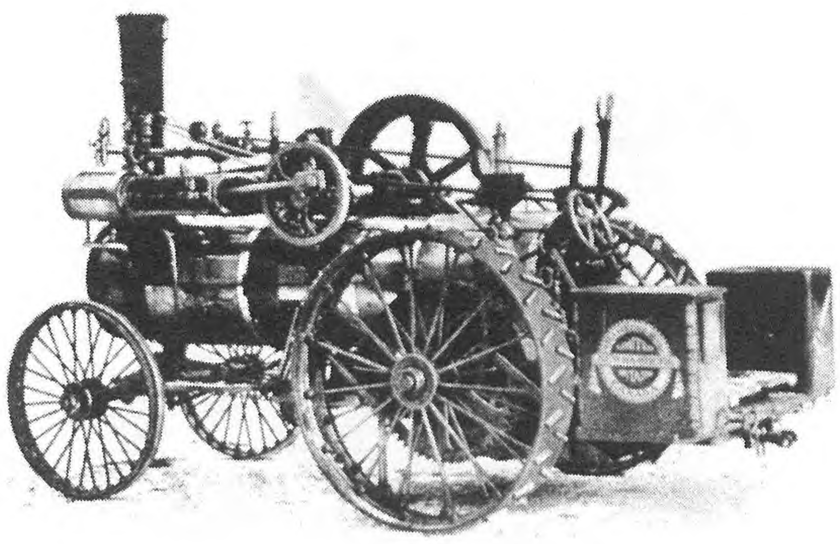
CLINTON, ONT.



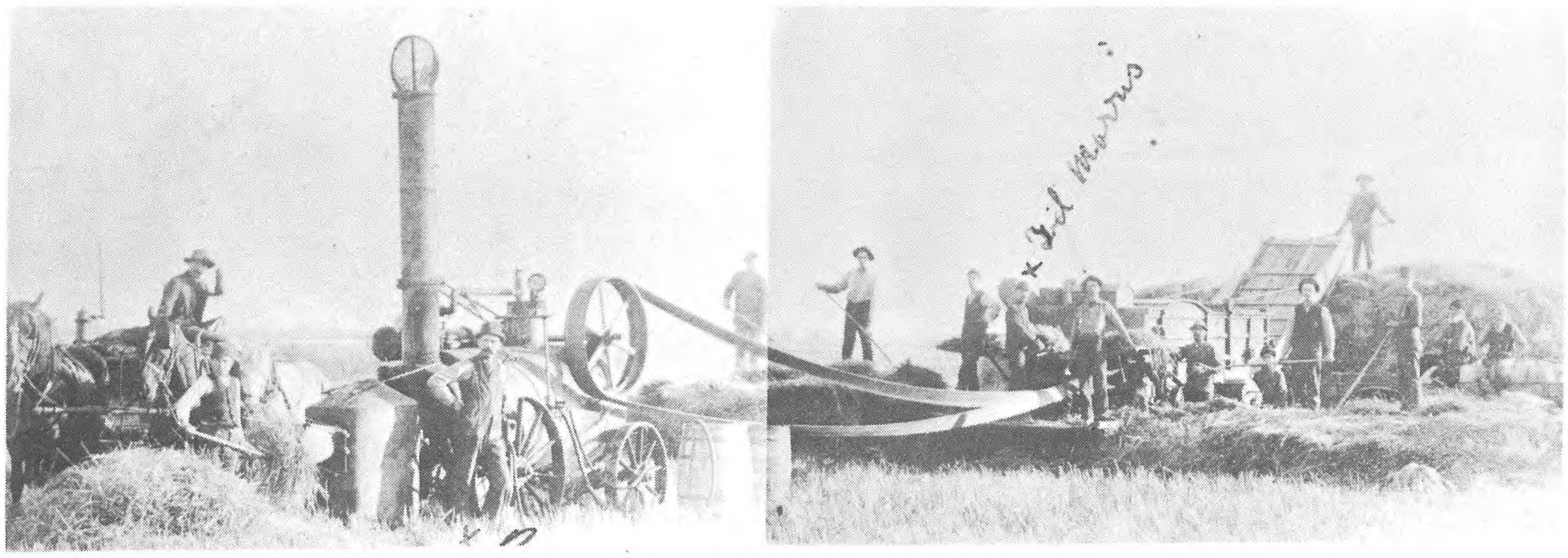
Macdonald 'Decker' Traction 22 hp 1910



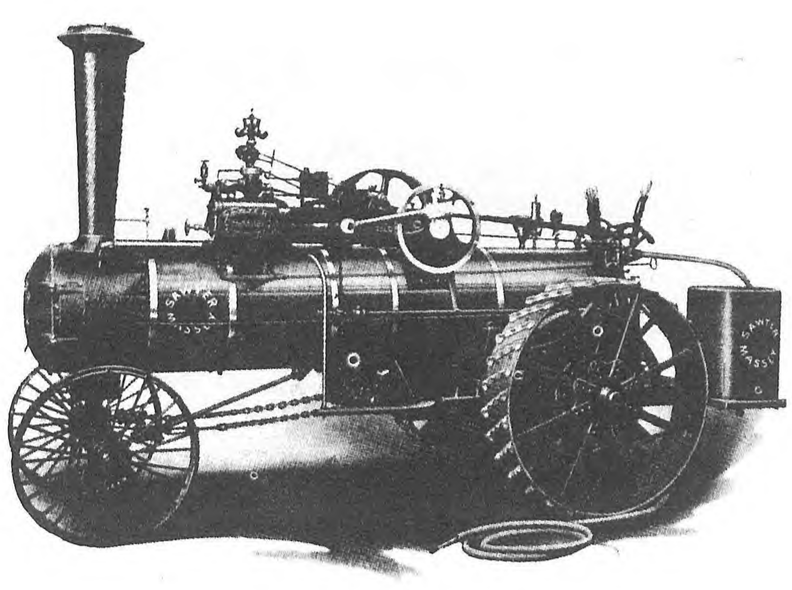
Glasgow, Macpherson 'End Shake Climax' Separator



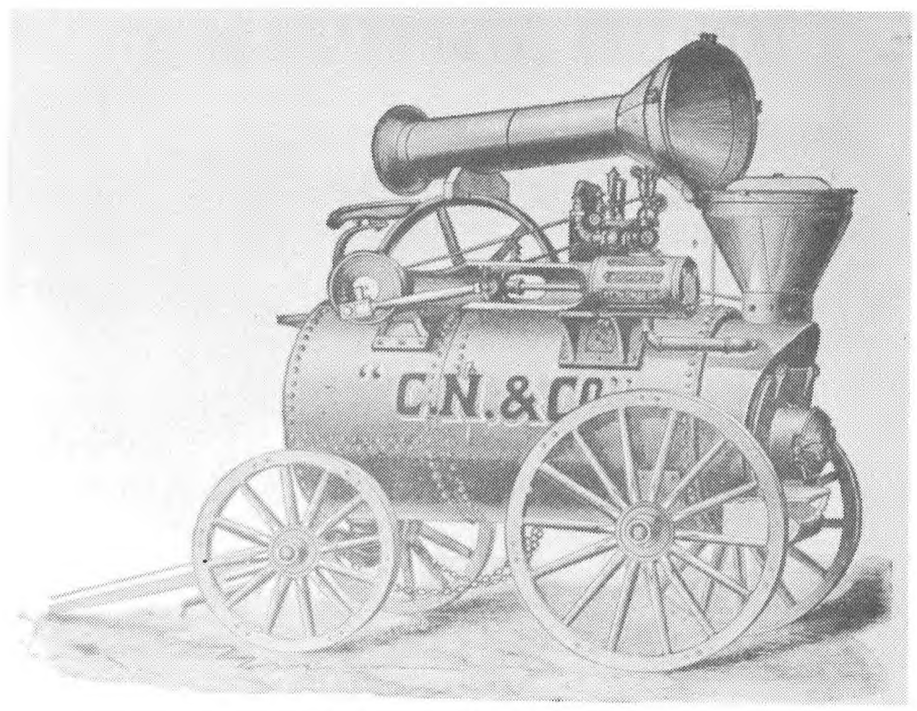
Hamburg Traction



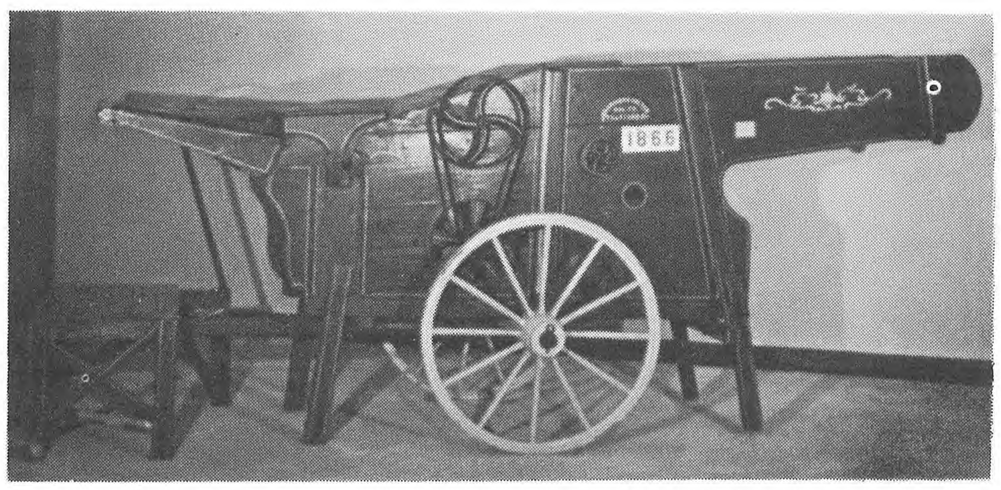
Norseworthy Portable at work



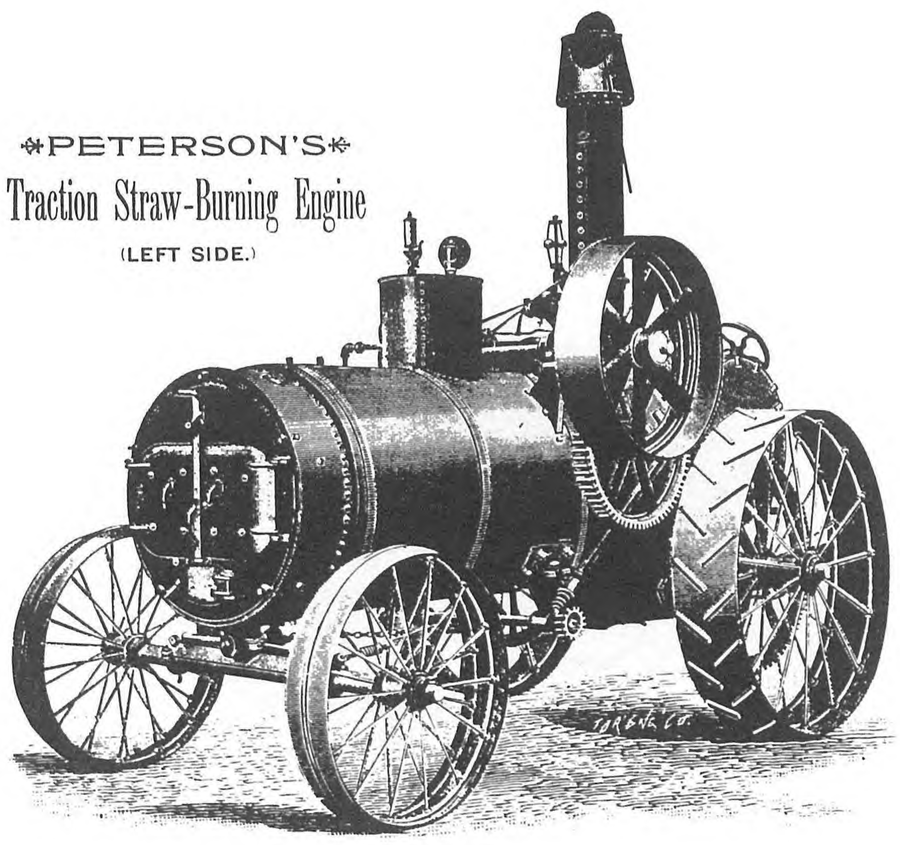
Sawyer-Massey Traction

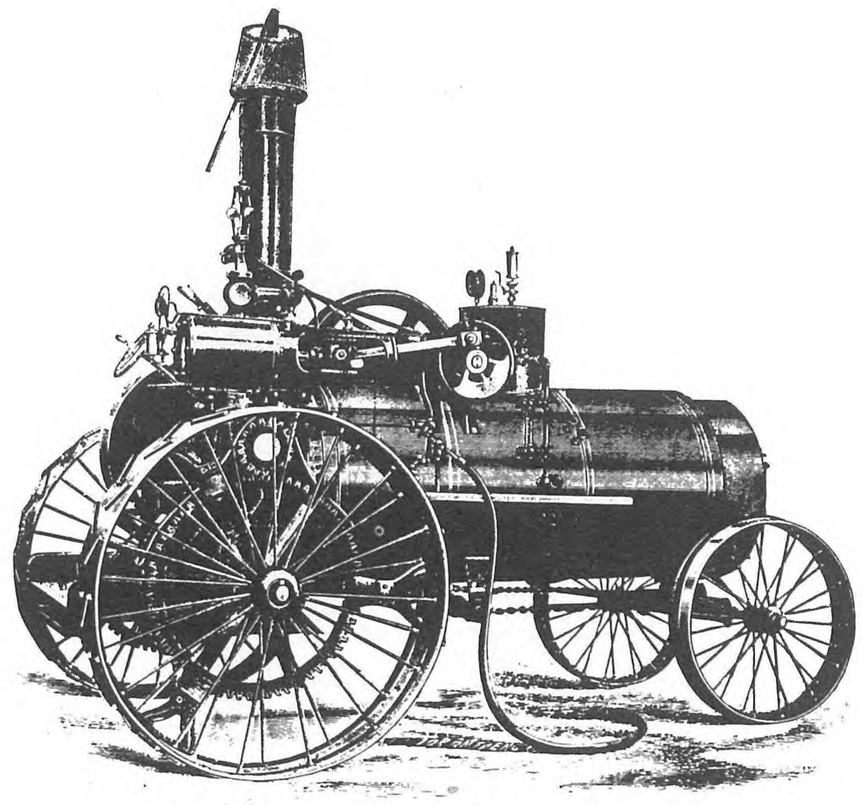


Norseworthy Portable

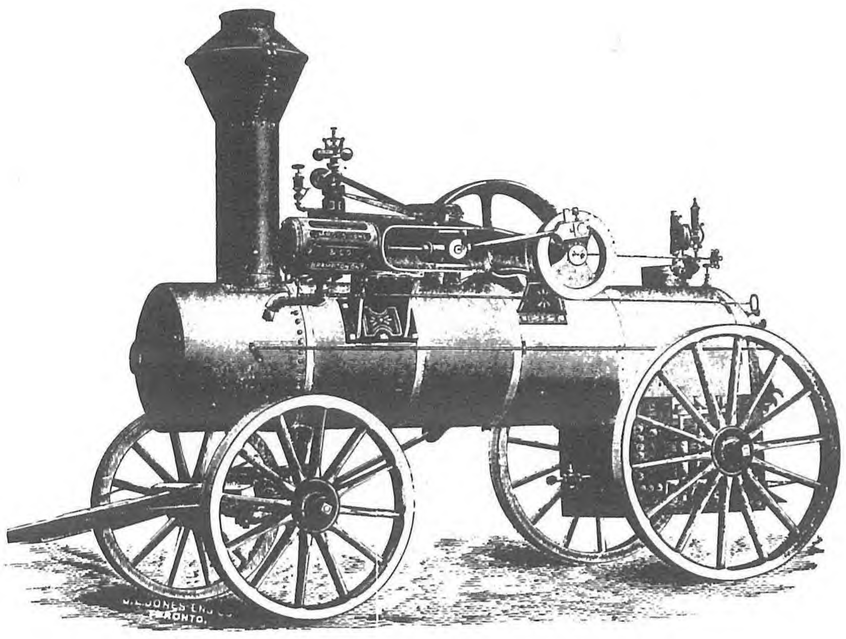


Sharman & Foster Thresher 1860

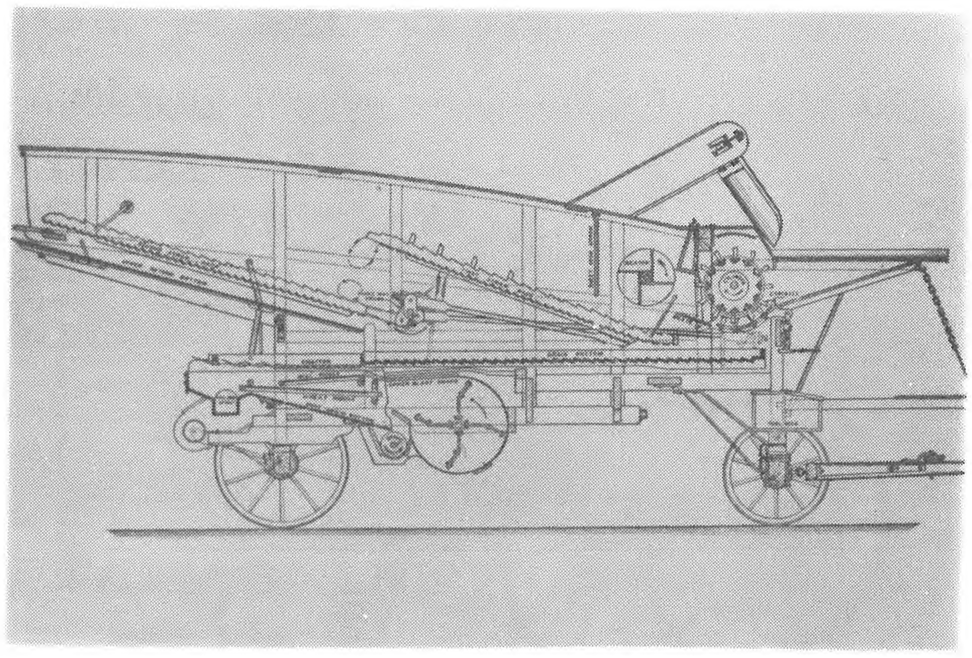




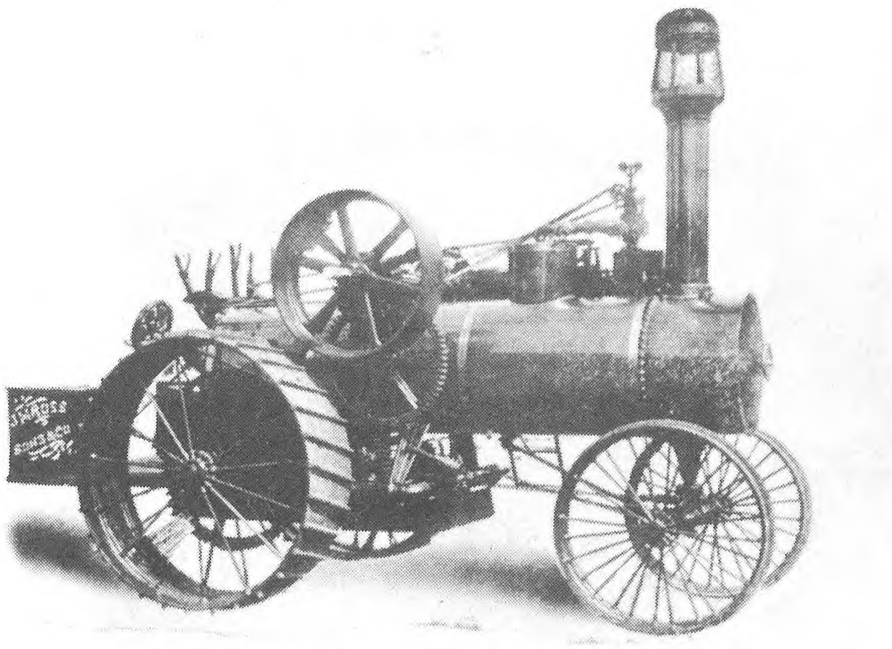
PETERSON'S TRACTION STRAW-BURNING ENGINE. (Right Side)



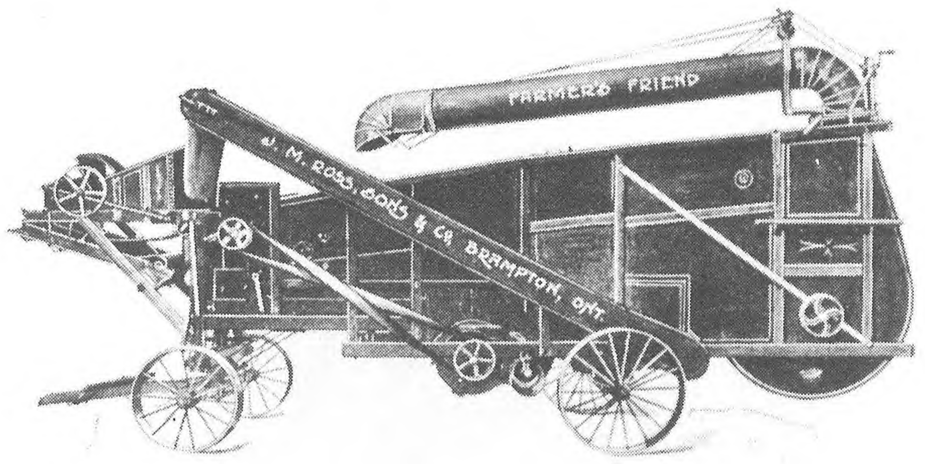
J.M. Ross 'Cornell' Portable 14 hp



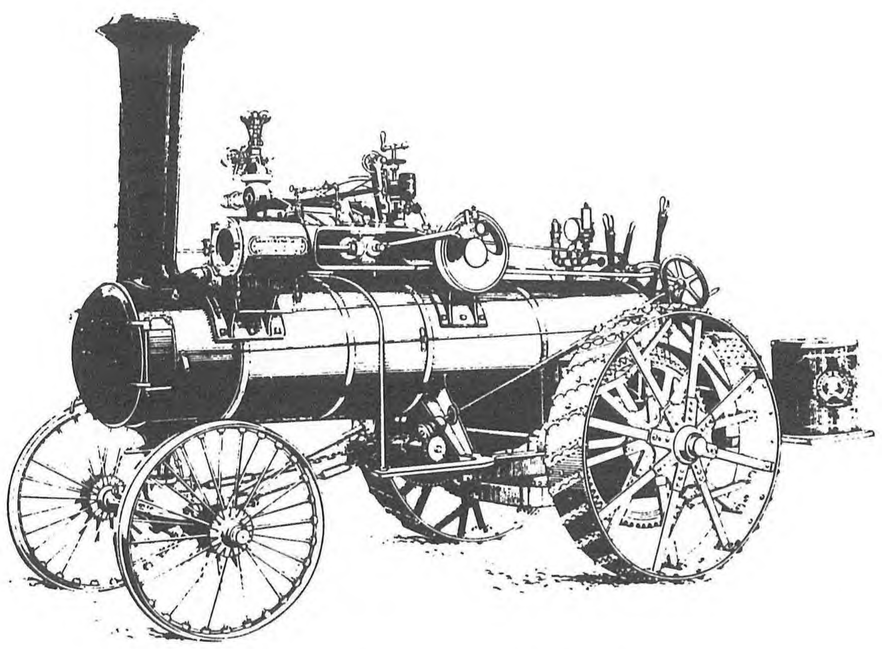
J.M. Ross Separator



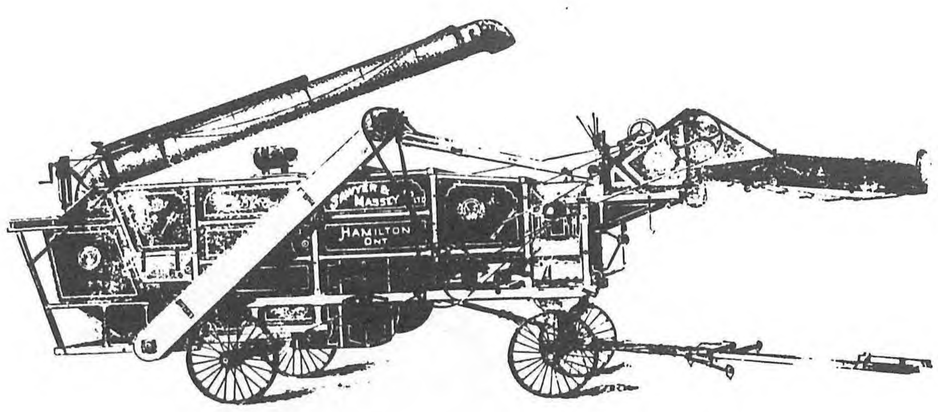
J.M. Ross 'Cornell' Traction 22 hp



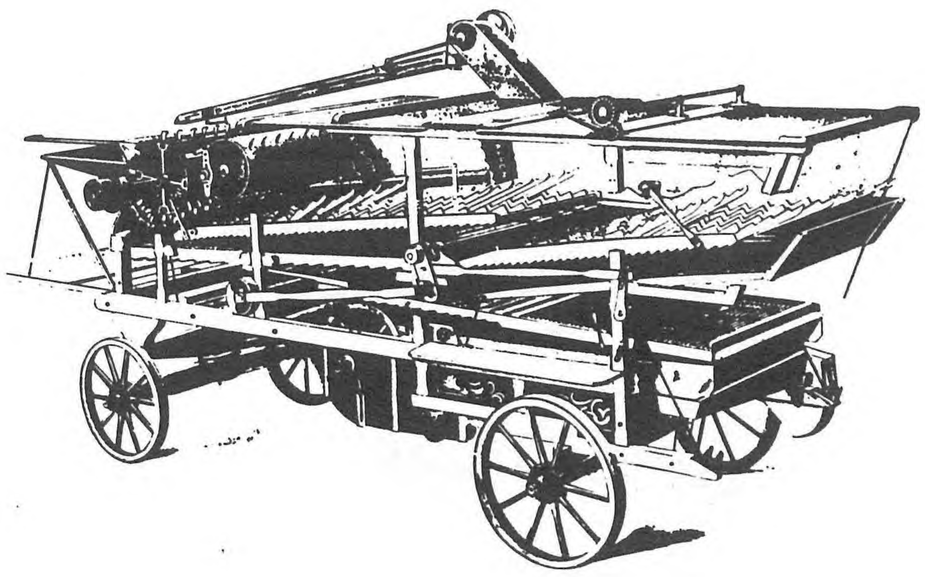
J.M. Ross 'Farmer's Friend' Separator



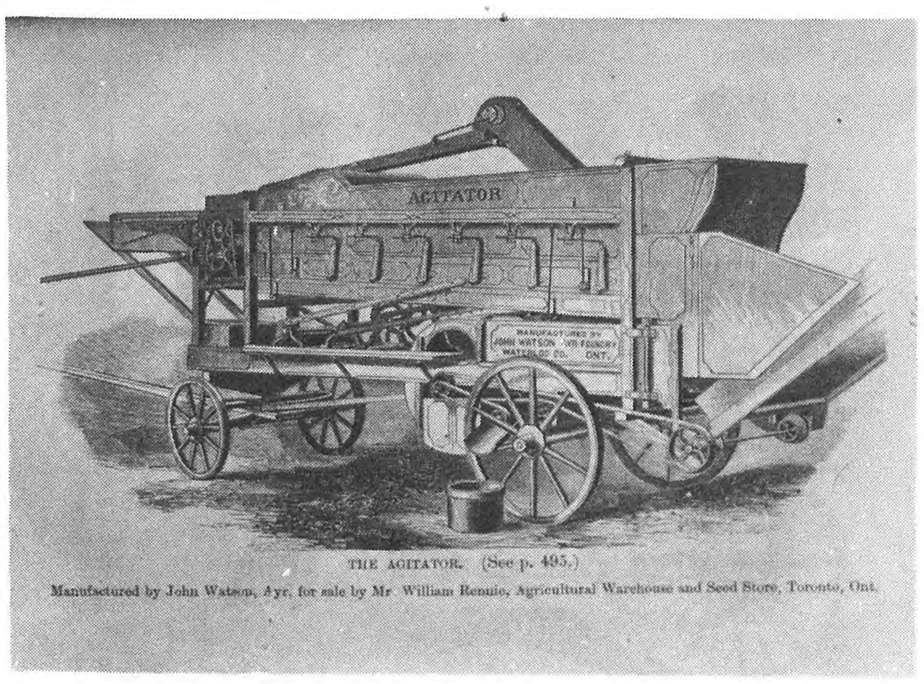
Sawyer-Massey Traction 18 hp



Sawyer-Massey 'Peerless' Separator



Sawyer-Massey 'Peerless' Separator

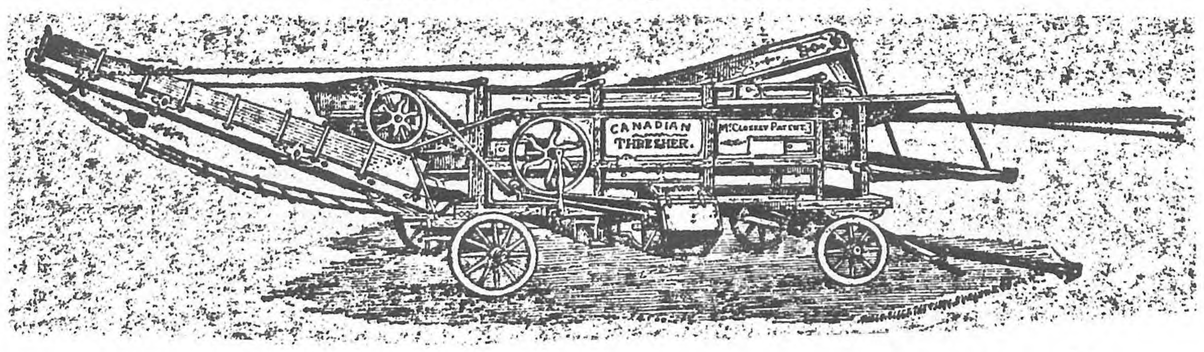


John Watson 'Agitator' Thresher

STEVENS, TURNER & BURNS,

CORNER RICHMOND AND BATHURST STREETS,

LONDON, 'ONT.



THE CANADIAN THRESHER.

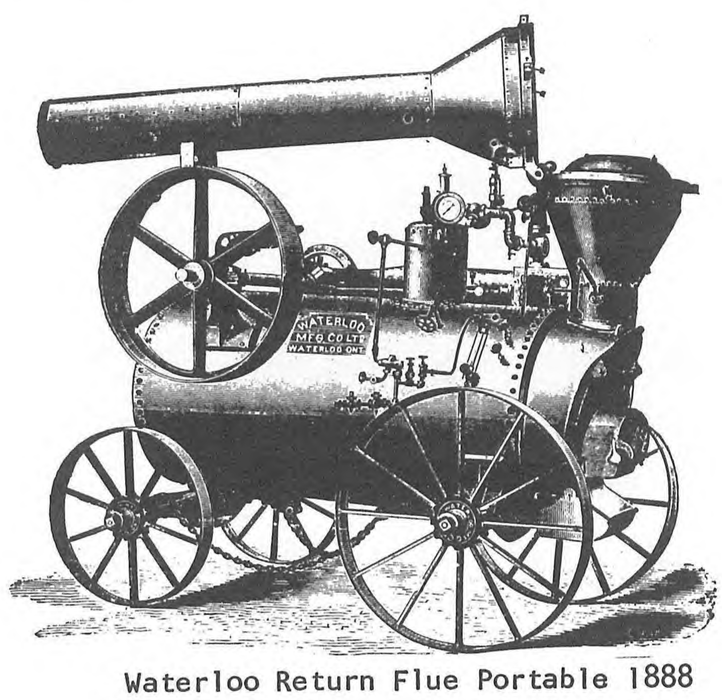
(McCLOSKEY PATENT.)

Our new patent CANADIAN THRESHER, or McCloskey Separator, is the best ever yet offered to threshers and farmers. This separator is entirely new in its construction. It will make a perfect separation of the grain from the straw, and is a beautiful cleaner, separating the chaff from the grain in the most perfect manner.

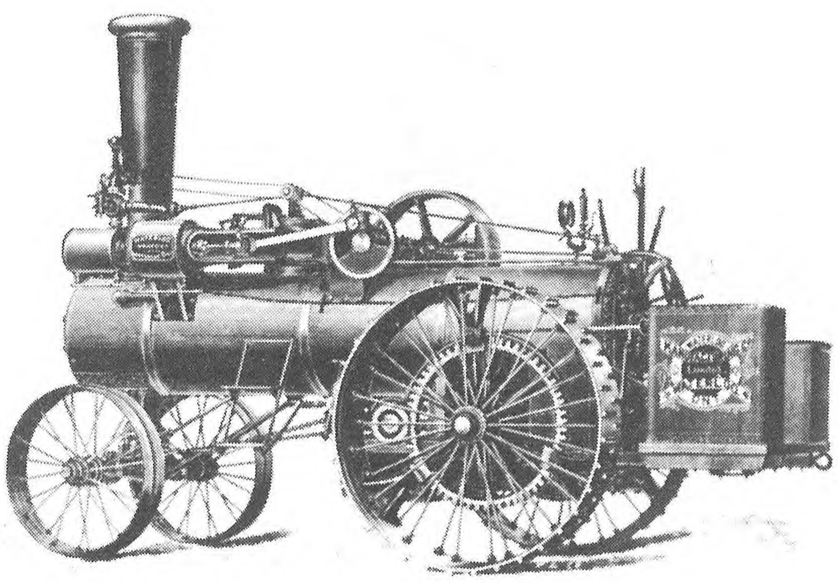
SEND FOR CIRCULARS AND PRICE LIST.



Stevens, Turner & Burns Portable
Hensall, 1880's

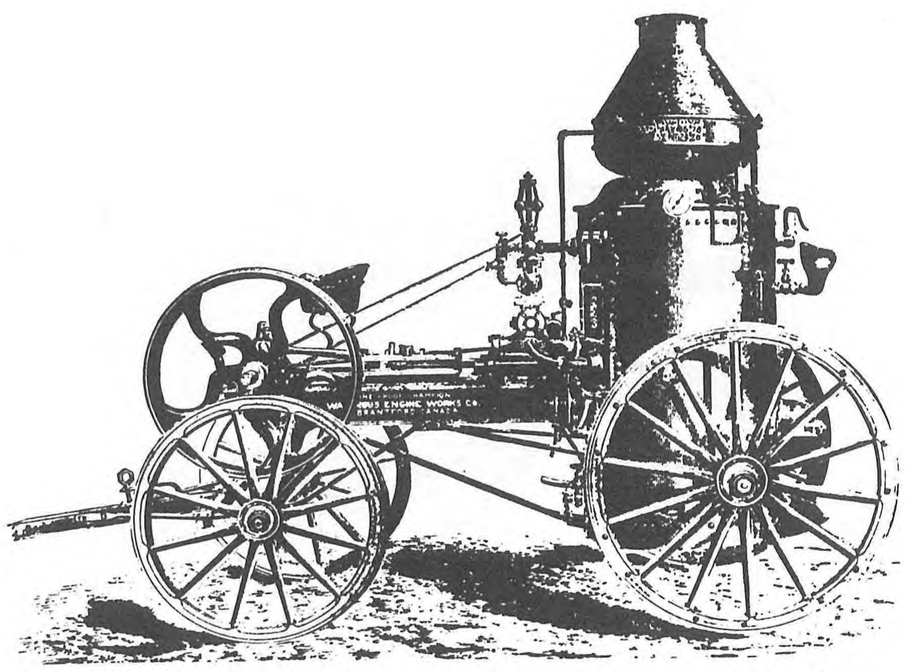


Waterloo Return Flue Portable 1888

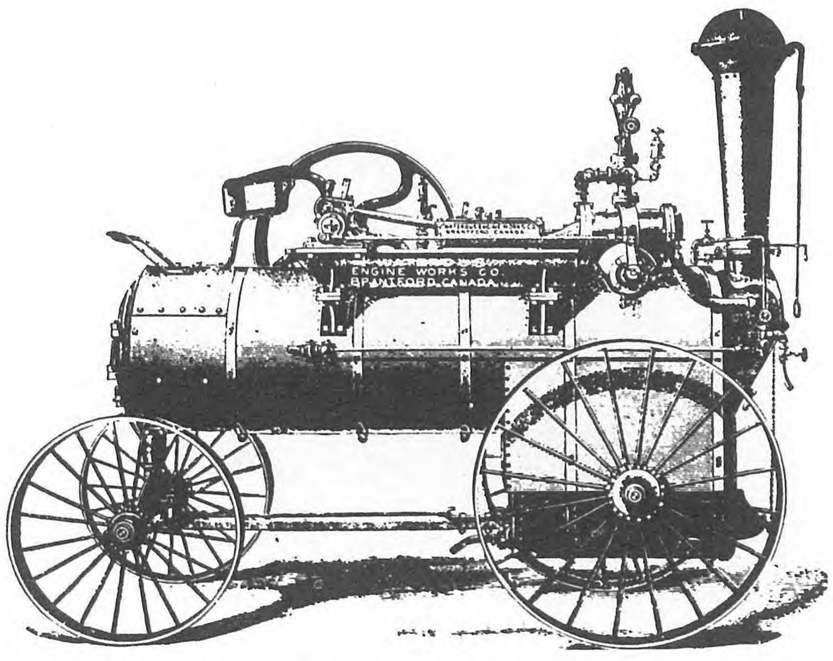


LEFT SIDE OF 20 H. P. COMPOUND TRACTION ENGIME.

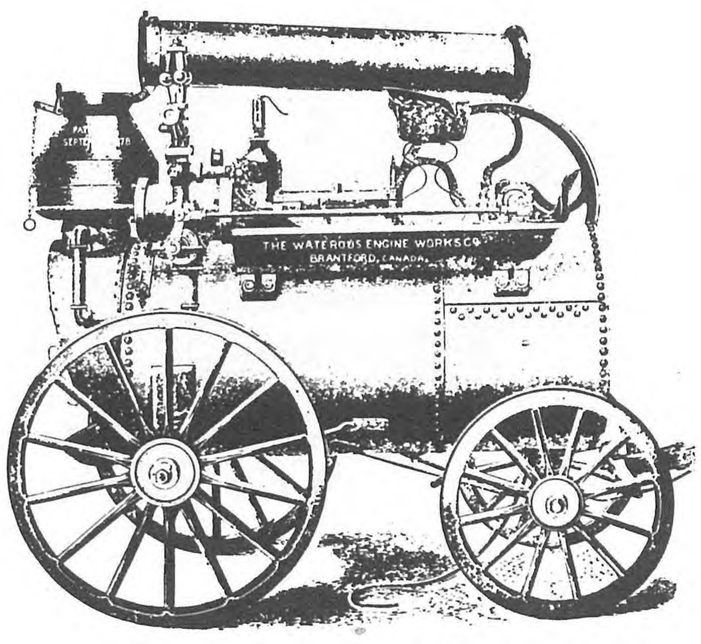
Waterloo Compound Traction 22 hp



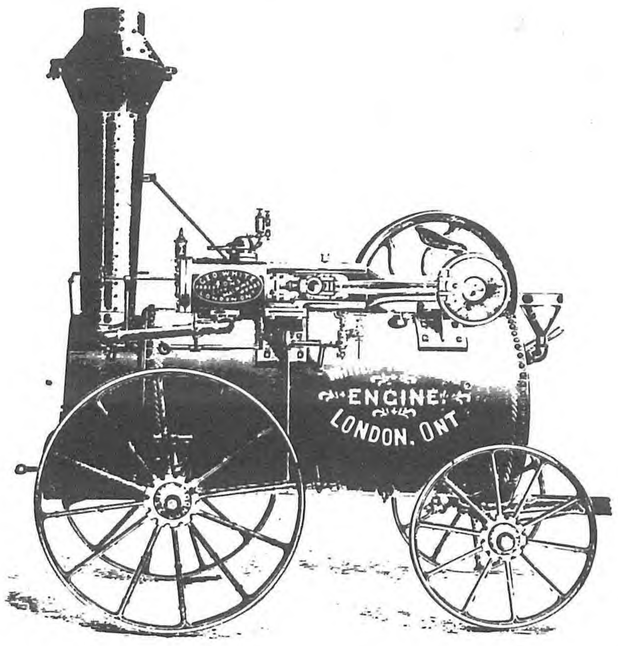
Waterous 'Fire-Proof Champion' Portable 1877



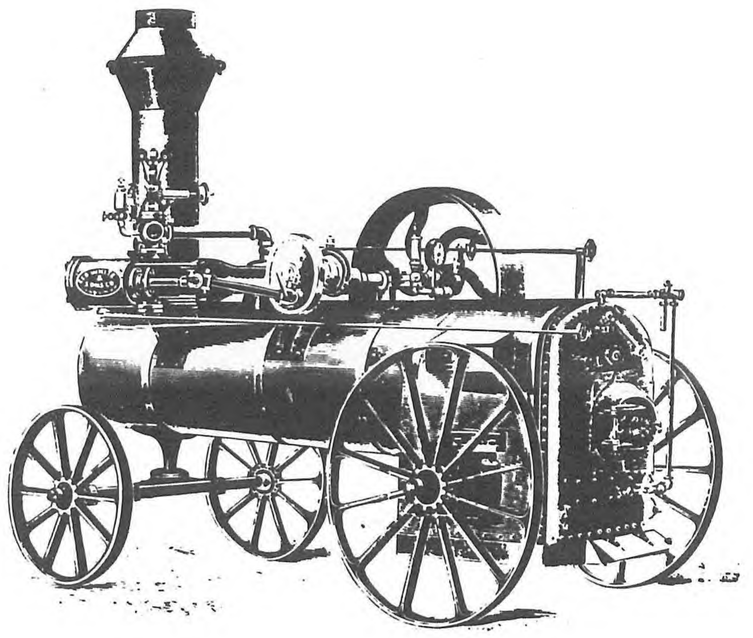
Waterous Return Tubular Fire-Box Portable 1890



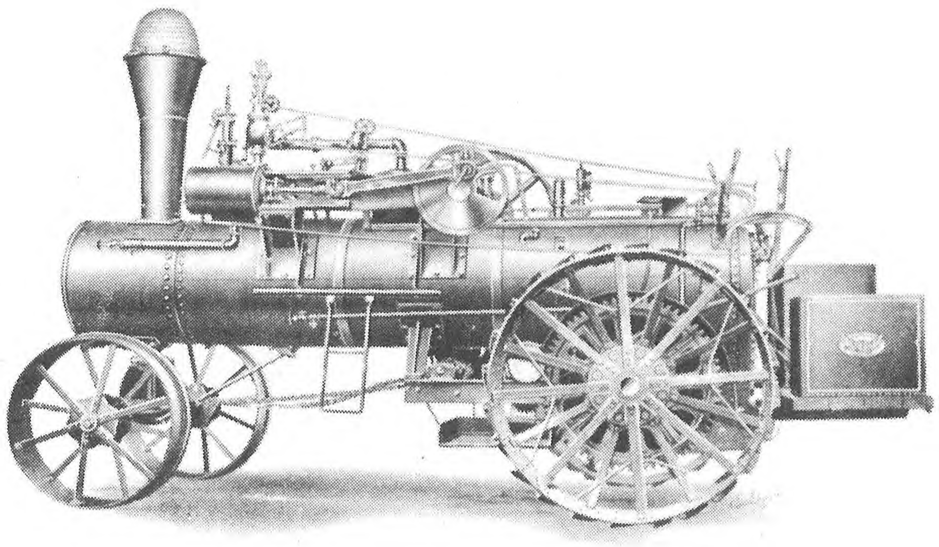
Waterous Return Flue Portable



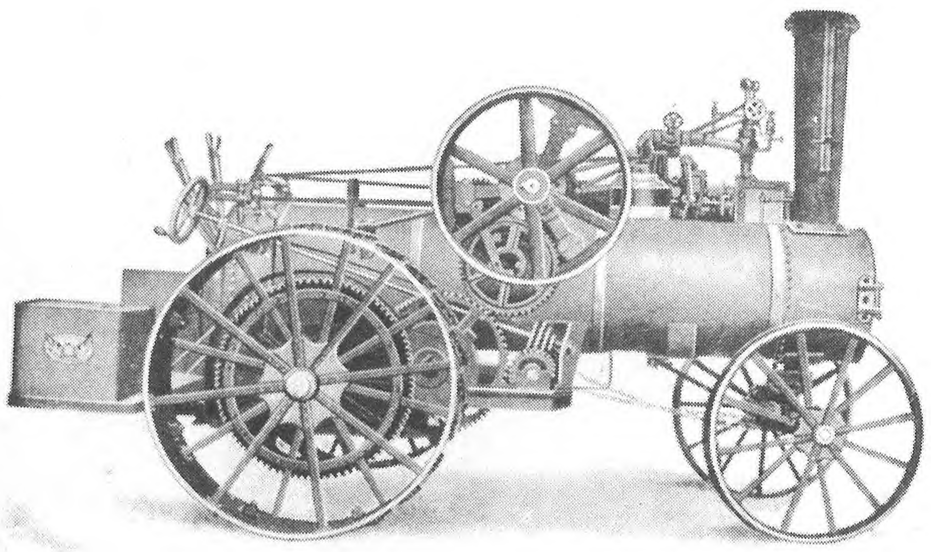
Geo White Return Tubular Portable



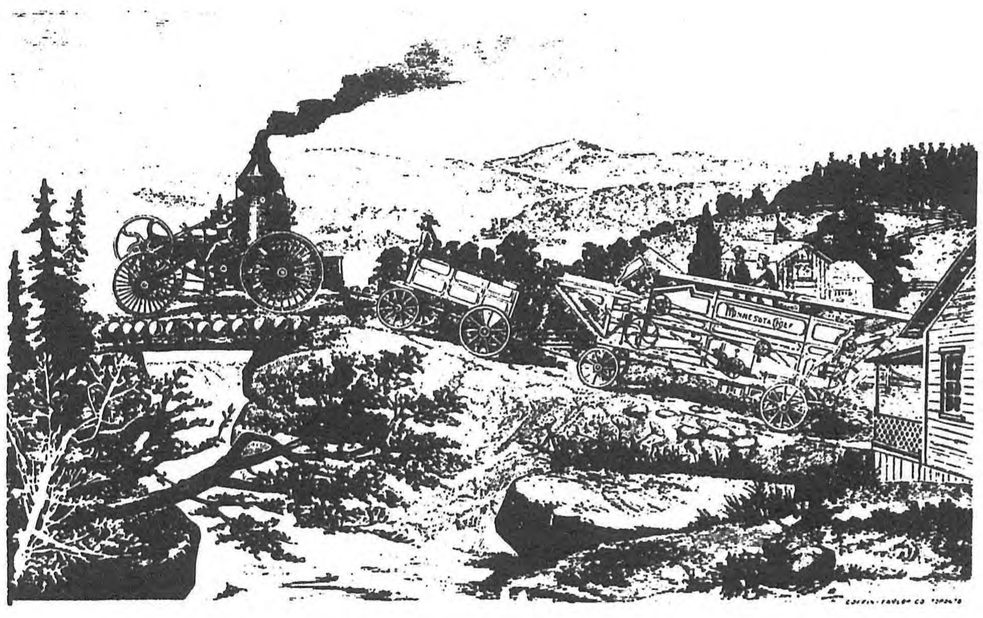
Geo White Locomotive Portable



Geo White General Purpose 25 hp 1910



Geo White Traction 1910



Waterous "Fire-proof Champion" with Minnesota Chief Separator

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Posted on: September 16, 2020
Posted by: Brian D. Szafranski
Elma New York USA
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